FIELD CROP ABSTRACTS

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CURRENT AGRICULTURAL RESEARCH IN AFRICA ON ANNUAL FIELD CROPS AND GRASSLANDS (continued)

In each of the numbers of this volume of *Field Crop Abstracts*, brief details (obtained from replies to questionnaires) will be published of those agricultural research institutes and experiment stations in Africa which are concerned with annual field crops, grasslands and fodder crops. Countries are arranged in alphabetical order. For each station, under the heading *Principal lines of research*, the numbers (1), (2), (3), (4) and (5) refer to : (1) Annual field- or fodder-crops (including cassava), (2) Grass or grass/legume mixtures, (3) Natural grasslands, (4) Farming systems, and (5) Other lines of research concerned with grasslands, fodders or annual field crops (except tobacco). The maximum and minimum shade temperatures relate to 1958 only.

NIGERIA, FEDERATION OF

Badeggi, Rice Research Station

Location : 7 miles E. of Bida, Niger Province, Northern Region. Lat. 9° 07′ N. Long. 6° 08′ E. Alt. 225–335 ft.
Met. data : Rainfall 48 in. (duration of dry season 21–22 weeks). Max. shade temp. 105·5°F. Min. shade temp. 51·2°F.
Size of station : 226 acres (80 ac irrigable).
Number of graduate research workers on staff : 5.
Principal lines of research :
(1) Rice : selection, breeding, processing and irrigation agronomy. Maize, cassava : agronomy.
(2) Grass-legume-rice relation studies.
(4) Mechanization of wet land rice cultivation. Integration of draught-cattle implements into rice cultivation. Irrigation agronomy.

Moor Plantation (North)

Location : 4 miles W. of Ibadan, Western Region. Lat. 7° 25′ N. Long. 3° 52′ E. Alt. 650 ft.
Met. data : Rainfall 49 in. (duration of dry season 13–15 weeks). Max. shade temp. 98°F. Min. shade temp. 58°F.
Size of station : 300 acres.
Number of graduate research workers on staff : 17.
Principal lines of research :
(1) Maize, cowpeas, groundnuts, sweet-potatoes, cassava, yams, cotton : agronomic trials and breeding and selection work.
(2) Trial comparing grass and legume fallows with bush fallows.
(4) Crop rotations.
(5) Studies of leaf composition and soil nutrient status. Plant protection research.

NIGERIA, EASTERN REGION

Umudike, Agricultural Research Station

Location : Umuahia-Ibeku. Lat. 5° 29′ N. Long. 7° 33′ E. Alt. 350 ft.
Met. data : Rainfall 87·5 in. (duration of dry season 14–16 weeks). Max. shade temp. 92·7°F. Min. shade temp. 67·7°F.
Size of station : 300 acres.
Number of graduate research workers on staff : 7.
Principal lines of research :
(1) Maize : varietal trials. Swamp rice : varietal, fertilizer and weed control trials. Legumes : fertilizer trials ; *Stylosanthes gracilis* : management Cassava, yams : varietal and developmental studies, fertilizer trials. Yams : agronomic studies including storage.
(2) Establishment and management of *Stylosanthes gracilis* and *Panicum maximum* mixtures.
(4) *Stylosanthes gracilis v. Acioa barteri* as fallow.

NIGERIA, NORTHERN REGION

Kano, Groundnut Breeding Sub-station

Location : Kano. Lat. 12° 3′ N. Long. 8° 32′ E. Alt. 1550 ft.
Met. data : Rainfall 33·89 in. (duration of dry season 26 weeks). Max. shade temp. 106°F. Min. shade temp. 47°F.
Size of station : 190 acres.
Number of graduate research workers on staff : 2.
Principal lines of research :
(1) Groundnuts : breeding, selection and testing of groundnuts suited to the main production area which lies in the immediate neighbourhood of Kano.

Katsina, Research Sub-station

Location : 3 miles from Katsina. Lat. 13° 1′ N. Long. 7° 36′ E. Alt. 1700 ft.
Met. data : Rainfall 27·18 in. (duration of dry season 30 weeks). Max. shade temp. 107°F. Min. shade temp. 46°F.
Size of station : 150 acres.
Number of graduate research workers on staff : 3.
Principal lines of research :
(1) *Pennisetum* millets : breeding. Sorghum, cowpeas, groundnuts : varietal trials. Agronomy of all crops of the Sudan-vegetation zone with special reference to the main problems : unreliable onset of rains, short wet season, high population density and relatively poor soils.
(2) Establishment and management trials, species and varietal trials of grasses and legumes. Particular problems are development of suitable perennial species in an area where the grasses are mainly annual, and of serviceable pasture legumes.
(3) Investigation of optimum management and improvement of rangeland : time and degree of grazing, time and frequency of burning, and improvement by sod-seeding.
(4) The zone contains the main areas of expansion of mixed farming, being, in the main, tsetse-free. Investigations include methods of combining sown pastures into the system, either for individual farms or for groups of farms, to eliminate the waste involved in relying on " bush grazing ".
(5) Leguminous and other shrubby browse plants are being sought. Investigations on reduction of wind erosion, on fodder conservation and on soil-moisture conservation.

Mokwa, Research Sub-station

Location : 22 miles from Jebba. Lat. 9° 18′ N. Long. 5° 4′ E. Alt. 500 ft.
Met. data : Rainfall 46·31 in. (duration of dry season 20 weeks). Max. shade temp. 105°F. Min. shade temp. 51°F.
Size of station : 500 acres (a further 5000 available for large-scale trials).
Number of graduate research workers on staff : 4.
Principal lines of research :
(1) Maize, sorghum, soyabeans, groundnuts, cassava, yams, Upland cotton, *Hibiscus* and *Urena* fibre spp., sesame : mechanization, planting, spacing, fertilizer, harvesting date, rotation and fallowing trials ; pest and disease studies, special emphasis on rosette of groundnuts. Soyabeans and sesame : breeding programmes.
(2) Observation plots only.

(3) The climax grassland is of perennial *Andropogon* and *Hyparrhenia* spp. The area is subject to very fierce grass fires in the dry season.

(4) The station is on the site of a settlement scheme which failed. Investigations are directed towards the main agricultural causes of this failure with a view to development of farming systems preferably mechanized, suitable for the area.

Samaru and Shika, Regional Research Stations

Location : 8 and 14 miles, respectively, from Zaria. Lat. 11° 11′ N. (Samaru). Long. 7° 38′ E. (Samaru). Alt. 2200 ft.

Met. data : Rainfall 44·28 in. (duration of dry season 23 weeks) (Samaru). Max. shade temp. 101°F. Min. shade temp. 53°F.

Size of station : Samaru 2500 acres. Shika 2900 acres.

Number of graduate research workers on staff : 29.

Principal lines of research :

The two stations, six miles apart, are run as a single unit; livestock breeding and husbandry, and pasture and rangeland work are centred at Shika.

(1) Maize, sorghum, *Pennisetum* millets, cowpeas, groundnuts, sweet-potatoes, cassava, Upland cotton : cultivation methods, planting, spacing, fertilizer, harvesting -date, rotation and fallowing trials ; introduction and varietal trials ; pest and disease studies, special emphasis on storage pests of cereals, groundnuts, cotton, seed dressings.

(2) Establishment and management of pastures, with and without legumes ; carrying capacity ; fertilizer response. Testing of imported and indigenous species ; development and testing of strains. Nutritive value investigations.

(3) Methods for improving botanical composition and carrying capacity by management, including, e.g. time of grazing and resting, time of burning, sod-seeding.

(4) Development of rotations and manurial regimes to maintain or increase fertility, to maximize profits from local peasant farms, and to reduce and if possible abolish the need for fallow periods. Investigations in mechanization including animal- and tractor-drawn implements and processing machinery.

(5) Team approach to general problem of improving fertility and yields, with special reference to soil structure and water relationships and soil conservation ; chemical and biochemical studies of crops and crop produce ; climatological studies, particularly intensity and duration of rainfall in relation to penetration and run-off.

NIGERIA, WESTERN REGION

Agege, Experiment Station

Location : Nr. Agege, 16 miles N. of Lagos. Lat. 6° 37′ N. Long. 3° 19′ E. Alt. 140 ft.

Met. data : Rainfall 54 in. (duration of dry seasons 13 weeks and 3–4 weeks). Max. shade temp. 98°F. Min. shade temp. 54°F.

Size of station : 250 acres.

Number of graduate research workers on staff : Nil.

Principal lines of research :

(1) Maize, cassava : varietal trials. Maize, cowpeas, cassava, yams : f.y.m. and fertilizer trials.

(2) Grazing trials, drought resistance trials and fertilizer trials on various grasses and grass/legume mixtures.

(5) Maize selection and multiplication.

Ilora, Crop Research Station

Location : 9 miles W. of Oyo. Lat. 7° 48′ N. Long. 3° 55′ E. Alt. 900 ft.

Met. data : Rainfall 43 in. (duration of dry seasons 12–16 weeks and 3–4 weeks). Max. shade temp. 99°F. Min. shade temp. 57°F.

Size of station : 605 acres.

Number of graduate research workers on staff : Nil.

Principal lines of research :

(1) Maize, edible legumes, cassava, yams, cotton and minor crops : fertilizer and other husbandry trials.

(5) Insecticide and herbicide trials on cotton and maize. Variety collection and yield trials on sorghum.

Moor Plantation (South)

Location : 4 miles W. of Ibadan. Lat. 7° 25′ N. Long. 3° 52′ E. Alt. 650 ft.

Met. data : Rainfall 49 in. (duration of dry seasons 13–15 weeks and 2–3 weeks). Max. shade temp. 98°F. Min. shade temp. 58°F.

Size of station : 300 acres.

Number of graduate research workers on staff : 14.

Principal lines of research :

(1) Maize, cowpeas and groundnuts : breeding and selection of improved strains.

(2) Establishment and persistence trials on certain grasses and grass/legume mixtures.

(5) Chemical, entomological, mycological and nematological laboratory studies.

NORTHERN RHODESIA

Mazabuka, Veterinary Research Station

Location : Mazabuka. Lat. 15° 50′ S. Long. 27° 45′ E. Alt. 3350 ft.

Met. data : Rainfall 35 in. (duration of dry season *c.* 30 weeks). Max. shade temp. 101°F. Min. shade temp. 42°F.

Size of station : 70,000 acres (60,000 seasonally flooded and unusable).

Number of graduate research workers on staff : 4.

Principal lines of research :

(1) Limited work on maize/grass rotations.

(2) Limited plot-trial and grazing studies of *Chloris gayana* and *Stylosanthes gracilis*.

(3) (i) Large-scale veld-grazing trials. These use animal gains and production as the main index of measurement and test different management systems. Treatments evaluated in the grazing trials include: varying the rate of stocking, the provision of supplementary feeding in the dry season, comparison of grazing management methods and differing herbage management practices.

(ii) Small-scale plot trials. Detailed replicated plot trials measure the herbage response to a complex battery of experimental treatments, e.g. fertilizer trials, growth and development studies, cutting and burning trials.

Promising results from the small-scale trials are incorporated into a pilot unit for field testing.

(iii) Long-term ecological trials on veld. A block of ecological trials has been laid down to determine the long-term effects of continued annual grazing, mowing and burning treatments on plant cover and bush encroachment.

(4) A pilot unit with a flexible management is run as a self-contained block, with the aim of maximum sustained production of beef together with maximum utilization of the natural veld.

Misamfu, Regional Experiment Station

Location : 3 miles N. of Kasama. Lat. 10° 12′ S. Long. 31° 11′ E. Alt. 4530 ft.

Met. data : Rainfall 50 in. (duration of dry season 32 weeks). Estimated max. shade temp. 99°F. Estimated min. shade temp. 33°F.

Size of station : *c.* 900 acres.

Number of graduate research workers on staff : 1.

Principal lines of research :

(1) Maize : spacing and fertilizer trials. Sorghum : selection of varieties for yield of grain and sugar. Finger millet : selection for yield, seed rate and method of sowing trials. Groundnuts : selection of varieties for yield, investigation into the cause of " pops", sowing-date trials. Cassava : selection amongst clones for resistance to mosaic disease and high yield.

(2) Small observational trials only, on grass/legume mixtures. *Chloris gayana* is the main grass used.

(4) Many investigations initiated to try and find a system that will support a permanent agriculture. Methods used : varying periods of rest under a legume or grass crop in long-term experiments ; combinations of trash farming with fertilizer and f.y.m. added ; fertilizer added to the local Chitemene system.

Mount Makulu, Agricultural Research Station

Location : Ten miles S. of Lusaka. Lat. 15° 30′ S. Long. 28° 15′ E. Alt. 4035 ft.

Met. data : Rainfall 32·87 in. (duration of dry season 27 weeks). Max. shade temp. 96°F. Min. shade temp. 36°F.

Size of station : *c.* 2800 acres.

Number of graduate research workers on staff : 12.

Principal lines of research :

(1) Wheat, maize, sorghum, groundnuts, cotton : plant-breeding and crop-husbandry work.

(2) Introduction and evaluation of grasses, legumes and grass/legume mixtures in terms of growth cycles and production, chemical composition, palatability, digestibility and animal production. Fertilizer studies ; grass silage. Irrigated crops and pastures. Seed studies.

(3) *Hyparrhenia*-dominant grasslands. Studies of growth and production and individual management factors such as defoliation and fertilizer application are to be used for the synthesis of progressively more intensive management systems to replace extensive ranching systems.

(4) Trials of discontinuous arable (i.e. bringing in grass) versus various types of continuous arable cultivation. Soil fertility and productivity studies.

(5) In addition to the work on natural grasslands at Mazabuka (q.v.) and work on farming systems, at the Misamfu Station near Kasama (q.v.) much supporting work is carried out at numerous smaller stations throughout the territory.

NYASALAND

Bvumbwe, Tung and Agricultural Experiment Station

Location : 8 miles S. of Limbe. Lat. 16° S. Long. 35° E. Alt. 3800 ft.

Met. data : Rainfall 53 in. (duration of dry season 26 weeks). Max. shade temp. 88·9°F. Min. shade temp. 45·9°F.

Size of station : 500 acres.

Number of graduate research workers on staff : 3.

Principal lines of research :

(1) Maize : fertilizer and spacing trials.

(2) Nitrogen/phosphate/lime experiment on a permanent pasture of *Cynodon plectostachyus* mainly and some *Chloris gayana*.

Grass/legume/fertilizer experiment using several varieties of grasses including *Chloris gayana, Cynodon plectostachyus* and several legumes including *Desmodium* spp. and *Stylosanthes*.

(4) A 7-course rotation of maize/soyabean/maize/4-year ley is practised.

Chitedze, Agricultural Research Station

Location : 10 miles W. of Lilongwe on the Central Province plateau. Lat. 14° S. Long. 33° 45′ E. Alt. 3600 ft.

Met. data : Rainfall 36·99 in. (duration of dry season 28–32 weeks). Max. shade temp. 93·2°F. Min. shade temp. 36·0°F.

Size of station : 1100 acres.

Number of graduate research workers on staff : 7.

Principal lines of research :

(1) Maize : breeding for hybrid and synthetic varieties. Groundnuts, Bambarra groundnuts, pigeon peas (*Cajanus cajan*), cassava : varietal testing. Fertilizer studies on main annual crops.

(2) Selection of grasses and legumes for grazing and fodder production in Central Province. Systems of management and conservation of pastures and fodders. Fertilizer studies.

(3) Improvement of dambo grazing and its management. (Dambos are seasonally waterlogged shallow valleys forming the upper parts of the regional drainage system for the Central Province plateau and other areas in Nyasaland and traditionally used for dry season communal grazing.)

(4) The station is responsible for the co-ordination of investigation into farming systems under the many diverse ecological conditions found throughout Nyasaland. There is a comprehensive series of short- and long-term rotation experiments from continuous arable cultivation to various lengths of rest and various resting crops including grazed and ungrazed grass leys.

(5) Soil moisture studies in relation to annual crops.

Makanga, Experiment Station

Location : Port Herald District, 3 miles N.E. of Chiromo. Lat. 16° 32′ S. Long. 35° 09′ E. Alt. 160 ft.

Met. data : Rainfall. 31·64 in. (duration of dry season 30 weeks). Max. shade temp. 109·3°F. Min. shade temp. 45·3°F.

Size of station : 200 acres.

Number of graduate research workers on staff : 1.

Principal lines of research :

(1) Maize, groundnuts : extension trials from Agricultural Research Station, Chitedze. Cotton : variety improvement, supplementary irrigation, resistance to bacterial blight, control of insect pests (Cotton Pest Research Scheme).

(5) Dry season irrigation. Crop water requirements.

RÉPUBLIQUE CENTRAFRICAINE

Boukoko, Centre for Agronomic Research

Location : Nr M'Baiki, in rain-forest zone (not far from the savanna zone). Lat. 3° 55′ N. Long. 17° 56′ E. Alt. 585 m (1919 ft).

Met. data : Rainfall 1745 mm (68·7 in.) (duration of dry season *c.* 12 weeks). Max. shade temp. 35·8°C (96°F). Min. shade temp 14°C (57·2° F).

Size of station : 590 hectares (1457 acres).

Number of graduate research workers on staff : 8.

Principal lines of research :

(1) Multiplication of *Stylosanthes gracilis*.

(2) *Tripsacum laxum* and *Pennisetum purpureum* for mulching.

(3) Savannas, with *Loudetia arundinacea* and *Hyparrhenia*, treated with the rotary cutter around the livestock-rearing area.

Gambo, Centre for Rural Modernisation

Location : Gambo, in savanna woodland zone. Lat. 4° 38′ N. Long. 22° 13′ E. Alt. 471 m (1545 ft).

Met. data : Rainfall 1582 mm (62·3 in.) (duration of dry season 8–10 weeks). Max. shade temp. 35°C (95°F). Min. shade temp. 14°C (57·2°F).

Size of station : 150 hectares (371 acres).

Number of graduate research workers on staff : Nil.

Principal lines of research :

(1) Rice varietal trials. Groundnut varietal trials. Cotton : varietal and sowing-date trials, fertilizer and insecticidal treatments.

(2) *Pueraria* in association with *Pennisetum*, grown on the fallow. *Stylosanthes gracilis* as a fallow plant and a cover plant under coffee.

(3) Natural pastures on fallows.

(4) 9-year rotation (3 years' cropping/6 years' fallow). Mechanical cultivation of the soils with tillage to a depth of 10 in.

(5) Observations on soil regeneration under a volunteer fallow.

Gounouman, Centre for Rural Modernisation
Location : Gounouman, Alindao District. Lat. 5° 9′ N. Long. 21° 15′ E. Alt. 500 m (1640 ft).
Met. data : Rainfall 1520 mm (59·8 in.) (duration of dry season *c.* 15 weeks). Max. shade temp. 38°C (100·4°F). Min. shade temp. 13°C (55·4°F).
Size of station : 960 hectares (2372 acres).
Number of graduate research workers on staff : 1.
Principal lines of research :
(1) Rice, groundnuts, cassava, cotton : varietal and agronomic trials (manuring, pest and disease control).
(2) Study of the behaviour of grasses grown for green manure, as fallow plants (*Pennisetum*) and for grazing (*Pennisetum, Paspalum virgatum*). Similar study with legumes as fallow plants and for grazing (*Stylosanthes* and *Pueraria*).
(3) Regeneration by means of mechanized treatments and early burning. Control of bush fires.
(4) Rotation trial : cotton/annual food crops (groundnuts, rice, maize)/cotton/short-duration fallow. Introduction of this rotation into African farming by means of partial mechanization.

Grimari, Principal Agricultural Station
Location : Grimari, Central Ubangi, savanna zone, Guinea-Sudan climate. Lat. 5° 30′ N. Long. 20° E. Alt. 434 m (1424 ft).
Met. data : Rainfall 1529 mm (60·2 in.) (duration of dry season 20 weeks). Max. shade temp. 36·6°C (98°F). Min. shade temp. 11°C (51·8°F).
Size of station : 500 hectares (1236 acres).
Number of graduate research workers on staff : 2.
Principal lines of research :
(1) Collections of maize, rice, groundnuts, cassava and cotton.
(2) *Pennisetum purpureum, Panicum maximum* + *Pueraria phaseoloides, Stylosanthes gracilis, Pennisetum pedicellatum* and *Melinis minutiflora.*
(3) *Imperata cylindrica, Rottboellia exaltata, Pennisetum polystachyon* and *Andropogon tectorum.*
(4) Pastures : ranching. Crops : semi-intensive (4 years' cropping/4 years' grazed fallow).
(5) *Hibiscus cannabinus, H. sabdariffa* and *Sorghum elegans.*

Ouaka Valley, Agricultural Experiment Station
Location : Ouaka Valley. Lat. 6° N. Long. 20° E.
Met. data : Rainfall 1557 mm (61·3 in.) (duration of dry season *c.* 15 weeks). Max. shade temp. 38·0°C (100·4°F). Min. shade temp. 12·0°C (53·6°F).
Size of station : 2300 hectares (5683 acres).
Number of graduate research workers on staff : 5.
Principal lines of research :
(1) Rice, groundnuts, cotton.
(2) *Stylosanthes gracilis* and *Paspalum virgatum.* Grasses and legumes : extensive management.
(4) Cotton in rotation, including : cotton/groundnuts/rice.

Poumbaïndi, Centre for Rural Modernisation
Location : Poumbaïndi, Paoua. Lat. 7° 6′ N. Long. 16° 26′ E. Alt. 650 m (2133 ft).
Met. data : Rainfall 1462 mm (57·6 in). (duration of dry season 18 weeks). Max. shade temp. 40°C (104°F). Min. shade temp. 9°C (48·2°F).
Size of station : 2640 hectares (6524 acres) of which 240 hectares (593 acres) are in use.
Number of graduate research workers on staff : Nil.
Principal lines of research :
(1) Groundnuts : manuring and multiplication. Cotton : varieties, manuring, insecticidal treatments and multiplication.
(2) *Pennisetum pedicellatum* for fallows. *Stylosanthes gracilis* as a fallow- and as a cover-crop.
(4) 4 years' cropping/4 years' fallowing.

RÉPUBLIQUE DU CONGO

Loudima, Agronomic Station
Location : In the savanna 60 km (37 miles) E. of Dolisie. Lat. 4° 10′ S. Long. 13° 4′ E. Alt. 165 m (541 ft).
Met. data : Rainfall 1100 mm (43 in.). Max. shade temp. 36·5°C (97·7°F). Min. shade temp. 11·5°C (52·7°F).
Size of station : 200 hectares (494 acres).
Number of graduate research workers on staff : 2.
Principal lines of research :
(1) Rice, groundnuts and forage plants : cultural methods.
(2) Investigations on the best forage species of grasses and legumes and the best mixtures.
(3) Improvement by the introduction of legumes (*Stylosanthes gracilis*).
(4) Study of crop rotations (annual crops and perennial forage crops). Study of mechanized soil cultivation.

Madingou, Agricultural Experiment Station
Location : Madingou, Sub-prefecture of Niari-Bouenza. Lat. 4° 35′ S. Long. 13° 45′ E. Alt. 200 m (656 ft).
Met. data : Max. shade temp. 37·3°C (99°F). Min. shade temp. 11·4°C (52·5°F).
Size of station : 2000 hectares (4942 acres).
Number of graduate research workers on staff : 2.
Principal lines of research :
(1) Cotton, *Urena lobata* and *Hibiscus cannabinus* : agronomic and genetical improvement.
(2) A study of pasture rotation with *Paspalum virgatum, Melinis minutiflora* and *Stylosanthes* sp., used either alone or in mixtures.
(4) Mechanized farming.

RÊPUBLIQUE DE CÔTE D'IVOIRE

Abidjan, Institute for Teaching and Tropical Research
Location : 17 km (10·5 miles) from Abidjan. Lat. 5° 19′ N. Long. 4° 13′ W. Alt. 29·5 m (96 ft).
Met. data : Rainfall 1850 mm (72·8 in.) (duration of dry season 6–8 weeks). Max. shade temp. 29·5°C (85·1°F). Min. shade temp. 22·1°C (71·8°F).
Size of station : 50 hectares (124 acres).
Number of graduate research workers on staff : 2.
Principal lines of research :
(1) Maize, leguminous cover crops, cassava, yam : selection and trial.
(2) Collection of forage grasses. Plots for the production of forage for grazing or cutting.
(4) Rotation of food crops (25 tons organic manure/ha)/grazed fallows.
(5) Agronomic problems concerned with organic manuring and the conservation of soil fertility.

Bingerville, Stock-rearing Centre
Location : Bingerville. Lat. 5° N. Long. 4° W.
Met. data : Rainfall 1600 mm (63 in.) (duration of dry season 25 weeks). Max. shade temp. 33·6°C (92·3°F). Min. shade temp. 14·8°C (58·5°F).
Size of station : 20 hectares (49 acres).
Number of graduate research workers on staff : 1.
Principal lines of research :
(2) Permanent sown pastures with *Digitaria* and *Centrosema.*

Bouaké-Minankro, Animal Husbandry Research Centre
Location : 8 km (5 miles) N. of Bouaké. Lat. 7° 45′ N. Long. 5° 2′ W. Alt. 350 m (1148 ft).
Met. data : Rainfall 1209 mm (47·6 in.) (duration of dry season 15 weeks). Max. shade temp. 37°C (98·6°F). Min. shade temp. 14·4°C (58°F).
Size of station : 406 hectares (1003 acres).

Number of graduate research workers on staff : 2.
Principal lines of research :
(2) Study of grasses and legumes which can be used for fallow grazing in the local rotation. Permanent sown pastures of *Digitaria umfolozi* associated with legumes.
(3) Improvement by scrub clearance, mechanized treatments and manuring.

Man, Coffee and Cinchona Experimental Station
Location : In the region delimited by the roads Man-Danané and Man-Douékoué. Lat. 7° 20′ N. Long. 8° 40′ W. Alt. 340–360 m (1115–1181 ft).
Met. data : Rainfall 1700 mm (66·9 in.) (duration of dry season 25 weeks). Max. shade temp. 35°C (95°F). Min. shade temp. 16°C (60·8°F).
Size of station : 297 hectares (734 acres).
Number of graduate research workers on staff : Nil.
Principal lines of research :
(1) Rice, soyabeans, *Vigna* and cassava.
(2) *Centrosema*, *Pueraria*, *Leucaena* and *Tripsacum laxum* for cutting.
(4) Permanent grazing.

RÉPUBLIQUE DU DAHOMEY

Ina, Experimental Farm
Location : Ina, between Parakou and Bimbéréké. Lat. 10° N. Long. 2° 40′ E. Alt. 341 m (1119 ft).
Met. data : Rainfall 1282 mm (50·5 in.) (duration of dry season 24 weeks). Max. shade temp., average 33·2°C (91·7°F), absolute 39·9°C (103·8°F). Min. shade temp., average 21·1°C (70°F), absolute 10·6°C (51°F).
Size of station : 234 hectares (578 acres).
Number of graduate research workers on staff : Nil.
Principal lines of research :
(1) Maize and sorghum : varietal and manurial trials, selection and seed disinfection. Groundnuts : varietal and manurial trials, and seed disinfection. Cassava : varietal trials and selection. Yam : varietal and manurial trials. Cotton and leguminous cover-crops : varietal trials. Rotation trials and soil regeneration.
(2) Sorghum and legumes, grown on the fallow and for green manure.
(3) 27 hectares (67 acres) of grasslands (Andropogoneae) used for silage-making and the production of litter.

Kpinnou-Athiémé, Stock-rearing Farm
Location : 26 km (16 miles) from Comé. Lat. 6° 32′ N. Long. 1° 48′ E. Alt. 100 m (328 ft).
Met. data : Duration of dry seasons *c.* 18 weeks and 10 weeks. Max. shade temp. 35·2°C (95·3°F). Min. shade temp. 16°C (60·8°F).
Size of station : 10 hectares (25 acres). Expansion to 2000 ha (4942 ac) proposed.
Number of graduate research workers on staff : Nil.

Niaouli, Agricultural Station
Location : 70 km (43 miles) N.W. of Cotonou. Lat. 6° 40′ N. Long. 2° 10′ E.
Met. data : Rainfall 1000 mm (39·4 in.) (duration of dry season 16 weeks). Max. shade temp., average 31·5°C (88·7°F), absolute 35°C (95° F). Min. shade temp., average 21·9°C (71·5°F), absolute 21·6°C (70·8°F).
Size of station : 220 hectares (544 acres).
Number of graduate research workers on staff : Nil.
Principal lines of research :
(1) Maize : selection for yield and resistance to *Puccinia polysora*. Cassava : selection for resistance to mosaic disease.

Okpara, Stock-rearing Station
Location : 15 km (9 miles) E. of Parakou. Lat. 9° 14′ N. Long. 2° 45′ E. Alt. 300 m (984 ft).
Met. data : Rainfall 1200 mm (47·2 in.) (duration of dry season 25 weeks).
Size of station : 30,000 hectares (74,132 acres).
Number of graduate research workers on staff : 1.
(1), (2), (3) and (4) Some research work is being done.

RÉPUBLIQUE DU NIGER

Kolo, Experimental Station
Location : 30 km (18·6 miles) S. of Niamey. Lat. 13° 18′ N. Long. 2° 21′ E. Alt. 180 m (591 ft).
Met. data : Rainfall 612 mm (24 in.) (duration of dry season 28 weeks). Max. shade temp. 43·6°C (110·5°F). Min. shade temp. 10·4°C (50·7°F).
Size of station : 41 hectares (101 acres) of which 31 ha (76·5 ac) are black soil which can be irrigated, and 10 ha (24·5 ac) are dunes.
Number of graduate research workers on staff : 2.
Principal lines of research :
(1) Wet season : millet, sorghum and groundnuts, on sandy soils ; maize, sorghum, rice and *Dolichos*, on lowlands. Dry season, under irrigation : wheat, maize, sorghum, millet and rice.

Tarna, Agronomic Research Station
Location : Tarna, via Maradi. Lat. 13° 27′ N. Long. 9° 5′ E. Alt. 325 m (1066 ft).
Met. data : Rainfall 600 mm (23·6 in.) (duration of dry season 35 weeks). Max. shade temp. 44°C (111·2°F). Min. shade temp. 9°C (48·2°F).
Size of station : 90 hectares (222 acres).
Number of graduate research workers on staff : 1.
Principal lines of research :
(1) Sorghum, *Pennisetum* spp., *Vigna*, groundnuts, Bambarra groundnuts, *Dolichos*, cassava, cotton : agronomic investigations and disease control.

RÉPUBLIQUE DU SÉNÉGAL

Bambey, Agronomic Research Centre
Location : Bambey, 125 km (77·7 miles) from Dakar (in the groundnut-growing region). Lat. 15° 42′ N. Long. 16° 27′W. Alt. 18 m (59 ft).
Met. data : Rainfall 630 mm (24·8 in.) (duration of dry season 34 weeks). Max. shade temp. 41°C (105·8°F). Min. shade temp. 9·8°C (49·6°F).
Size of station : 640 hectares (1581 acres).
Number of graduate research workers on staff : 18.
Principal lines of research :
(1) Sorghum, *Pennisetum* spp., groundnuts, *Vigna*, *Phaseolus*, *Dolichos* and cassava : breeding, selection, agronomic studies and multiplication.
(2) Tropical and subtropical forage plants : introduction, collections, acclimatization, agronomic studies, multiplication and distribution.
(3) Study of cultural methods and manuring of pastures. Study of dynamics of the wild vegetation.
(4) Intensive : cultivation by mechanized means and draught animals ; 5-year rotation.
(5) Ensilage ; phytosociology.

Richard-Toll, Experimental Station
Location : Richard-Toll, N. border of Sénégal, 110 km (68·4 miles) from St. Louis on River Sénégal. Lat. 16° 30′ N. Long. 15° 40′ W. Alt. 3 m (10 ft).
Met. data : Rainfall 380 mm (15 in.) (duration of dry season 36 weeks). Max shade temp. 44°C (111·2°F). Min. shade temp. 11°C (51·8°F).
Size of station : 120 hectares (296 acres).
Number of graduate research workers on staff : 2.
Principal lines of research :
(1) Irrigated rice : cultural methods, varietal improvement and manurial trials.
(4) Mechanized cultivation.
(5) Sorghum, cotton.

RÉPUBLIQUE SOUDANAISE

Bamako-Sotuba, Federal Centre for Animal Husbandry Research

Location : Bamako-Sotuba. Lat. 12° 40′ N. Long. 7° 57′ W. Alt. 325 m (1066 ft).
Met. data : Rainfall 1164 mm (45·8 in.) (duration of dry season 28 weeks). Max. shade temp. 42·2°C (108°F). Min. shade temp. 10°C (50°F).
Size of station : 900 hectares (2224 acres).
Number of graduate research workers on staff : Nil.
Principal lines of research :

(1) Maize, sweet-potatoes, cassava, cover crops, fodder-maize, millet for silage, green manures.

(2) Sudan region. *Andropogon gayanus* and *Stizolobium aterrimum* for silage. Sown pastures in rotation (with cultivation by draught animals) : cotton/millet/groundnuts/millet/5 years *Digitaria umfolozi*.

Sudan-Guinea region. Rotation as for Sudan region above but *D. umfolozi* in place of *Paspalum virgatum*.

Guinea region. *Panicum maximum* for the production of f.y.m., *D. umfolozi* for grazing, *Tripsacum laxum* for soilage.

(3) Wet season. Pastures with *Andropogon gayanus* and *A. pseudapricus* : stocking 300 kg/ha/4 months.

Dry season : grassland with *Acroceras amplectens* and *Hyparrhenia rufa* : stocking 300 kg/ha/8 months. If the *H. rufa* grassland is not available, the dry-season grazing area of *A. gayanus* should be trebled.

(4) *Andropogon* spp., grown for grazing, hay and silage.

(5) Sahel region : mapping and study of the forage value of natural pastures for the provision of water points.

Sudan region : study of forage production in the dry season by means of rotations, hay and silage. Mixed farming, sown pastures.

Ibetemi, Floating-rice Station

Location : *c.* 8 km (5 miles) from Mopti. Lat. 14° 31′ N. Long. 4° 6′ W. Alt. 269 m (883 ft).
Met. data : 660 mm (26 in.) (duration of dry season 35 weeks).
Size of station : 873 hectares (2157 acres).
Number of graduate research workers on staff : 1.
Principal lines of research :

(1) Rice : selection and multiplication trials.

Katibougou, Agricultural Station

Location : Katibougou, via Koulikoro. Lat. *c.* 15° N. Long. *c.* 5° W.
Met. data : Rainfall 900 mm (35·4 in.) (duration of dry season 7 months). Max. shade temp. 41°C (105·8°F). Min. shade temp. 9°C (48·2°F).
Size of station : 122 hectares (301 acres).
Number of graduate research workers on staff : 2.
Principal lines of research :

(1) 4-year rotations — cotton/sorghum and *Pennisetum*/groundnuts/fallow (ploughed-in).

(2) *Digitaria umfolozi*.

(3) Wet season : *Andropogon gayanus, Pennisetum pedicellatum, Imperata cylindrica, Alysicarpus vaginalis* and *Rottboellia exaltata*.

Dry season : *Paspalum scrobiculatum, Vetiveria nigritana, Setaria sphacelata* and *Sorghum trichopus*.

(5) Rotation trials, 3 rotations : (1) millet (or sorghum)/groundnuts/millet (or sorghum)/*Digitaria* plus calabash/pepper/green manure (sorghum or millet) ; (2) millet (or sorghum)/groundnuts/millet (or sorghum)/*Digitaria* plus cassava/cassava/green manure (sorghum or millet) ; (3) groundnuts/millet (or sorghum)/groundnuts/green manure (millet or sorghum).

M'Pesoba, Agricultural Experiment Station

Location : M'Pesoba, 35 km (22 miles) from Koutiala and 130 km (81 miles) from Ségou. Lat. 12° 37′ N. Long. 5° 41′ W. Alt. 305 m (1000 ft).
Met. data : Rainfall 850 mm (33·5 in.). Max. shade temp. 44·6°C (112·3°F). Min. shade temp. 7·8°C (46°F).
Size of station : 160 hectares (395 acres).
Number of graduate research workers on staff : 2.
Principal lines of research :

(1) Sorghum, millet, maize, groundnuts, cassava, cotton.

(2) *Digitaria umfolozi*.

(3) *Andropogon gayanus*.

(4) 4-year rotation : cotton (with f.y.m.)/sorghum/groundnuts/fallow.

SIERRA LEONE

Musaia, Animal Husbandry Station

Location : Northern Sierra Leone. Lat. 9° 45′ N. Long. 11° 34′ W. Alt. 1150 ft.
Met. data : Rainfall 78·6 in. (duration of dry season 16 weeks). Max. shade temp. 97°F. Min. shade temp. 45°F.
Size of station : 2400 acres.
Number of graduate research workers on staff : 1.
Principal lines of research :

(1) Local legumes and cassava for stock feed and local distribution only.

(2) Legumes, pasture and forage grasses but not as mixtures.

(3) Experiments on time of burning, amount and type of natural shade.

(5) Main aim of station is the selection of early-maturing N'dama beef animals.

Rokupr, West African Rice Research Station

Location : Rokupr. Lat. 9° 01′ N. Long. 12° 57′ W. Alt. met. station 26 ft, farm 3 ft.
Met. data : Rainfall 116·95 in. (duration of dry season *c.* 25 weeks). Max. shade temp. 99°F. Min. shade temp. 60°F.
Size of station : 112 acres of upland, 66 acres of swamp farm.
Number of graduate research workers on staff : 8.
Principal lines of research :

(1) All aspects of research on rice, in particular : production of improved varieties for West Africa by introduction, selection and hybridization. Maintenance of West African rice varietal collection. Maintenance of pure nucleus seed stocks of approved varieties. Studies on the physiology of the rice plant. Post-harvest investigations into milling quality. Investigations into chemistry and microbiology of mangrove-swamp soils and methods for their reclamation. Studies on the fertility and chemistry of waterlogged soils.

(To be continued)

FIELD CROPS

CEREALS

WHEAT

See also Abs. 859, 871, 933.

553 Brady, H. A. **An evaluation of tillage practices for winter wheat in the semi-arid region of southwestern Kansas.** *Proc. Soil Sci. Soc. Amer.* 1960, **24,** No. 6, 515–18, bibl. 4. [Garden City Branch Sta., Kansas Agric. Exp. Sta., Garden City]

Three methods of seed-bed preparation for winter wheat, viz. subsurface tillage, one-way discing and mouldboard ploughing, were compared under both continuous cropping and a wheat/fallow rotation. Subsurface tillage effectively controlled erosion by wind and water. On fallowed land, one-way discing gave slightly higher average grain yields than the other 2 methods, while under continuous cropping subsurface tillage gave the highest yields. Less runoff occurred with subsurface tillage than with the other 2 techniques, but evaporation was greater. F. s.—r.b.

554 Farmer and Stockbreeder. **Aircraft sow winter wheat in waterlogged fields.** *Fmr and Stk-Breed.* 1960, **74,** No. 3703, 62–3, illus.

A description is given of successful sowing operations by an Auster 'plane flying at 65 m.p.h., 30–50 ft above ground, sowing 1·75 – 2 cwt of mergamma-dressed seed per acre. Test counts showed that 400–650 grains of seed per sq. yd had been sown. Small aircraft of this sort can sow up to 400 acres per week in favourable flying weather. It is not essential to cover the seed after sowing, but most farmers prefer to harrow it in. The dressed seed proved unpalatable to birds.—a.g.g.h.

555 Gadd, I. Värdet av " mögelskadad " säd som utsäde belyst genom laboratorie — och fältförsök. [**The sowing value of seed infected by moulds elucidated by means of laboratory and field experiments.**] *Medd. Frökontrollanst., Stockh.* 1959, No. 34, 26–82, bibl. 29, illus., English summary.

An account is given of many trials carried out with seed of spring wheat and barley in different years. In the 1957 field trials the seed, which was sown at 3 dates, consisted of : (a) seed infected by moulds which was treated with panogen or betoxin 61 (2 organic mercury preparations) or with TMTD (thiram), or was left untreated ; and (b) high-quality seed of a high germinating capacity and undamaged by moulds. In the first sowing, percentage emergence was relatively low and uniform from all types of seed ; the treated seed emerged only slightly better than the untreated. This is attributed to the fact that the soil was very dry and moulds had no appreciable effect. In the second sowing 3 weeks later, the untreated seed, infected by moulds, gave poor emergence ; the seed dresssed with the 2 mercury preparations gave somewhat better emergence than the untreated seed, but was still unsatisfactory ; the seed treated with TMTD gave substantially higher figures for emergence, and were about the same as from the high-quality seed. In the third sowing which was carried out under unfavourable conditions (very late in the season, in a cold, moist, hard, clay soil) the percentage emergence of the mould-damaged seed was very low and uneven ; the emergence of the seed treated with TMTD was considerably better than that of the untreated seed, but was still unsatisfactory ; the high-quality seed, on the other hand, emerged relatively well. When sown under unfavourable conditions, mould-infected seed, even of a high germinating capacity, was shown to be considerably inferior to non-infected seed. F. Eng. s. —e.b.o.

556 Sikka, S. M. and Jain, K. B. L. **A study of the differential response of some varieties of wheat to different environmental and cultural conditions. 2. Performance under different levels of soil fertility and sowing dates.** *Indian J. Agron.* 1960, **4,** No. 3, 154–63, bibl. 24. [Agric. Coll., Bapatla, Andhra Pradesh, India]

557 Forbes, N. **Sowing dates, seed rates and nitrogen for spring wheat.** *Exp. Husb.* 1960, No. 5, 1–6, bibl. 1. [Boxworth Exp. Husb. Fm, Cambs]

During 1952–7 the effect was investigated of rate of N applications and seed rate in relation to time of sowing Atle spring wheat on a chalky boulder clay. In all experiments the spring wheat followed winter wheat and the following treatments were applied : (a) early and late sowing ; (b) seed rates of 2, 3 and 4 bu/ac ; (c) 1 and 3 cwt ammonium sulphate per ac applied as a top-dressing to early sowings and broadcast on the seedbed of late sowings. Yields were not affected by delaying sowing to the end of April or using a heavier seed rate at the late sowing. Late sowing tended to reduce the response to N and reduced the incidence of wild oats.—s.m.j.

558 Sikka, S. M. and Maini, N. S. **Reaction of some new Punjab wheats to the varying conditions of season, sowing date and manuring.** *Indian J. Agron.* 1960, **4**, No. 4, 230–7, bibl. 13. [Indian Agric. Res. Inst., New Delhi]

Differential behaviour of a large number of newly evolved Punjab wheats was studied for 2 years when sown at different dates and given different rates of manuring. The results showed that: (1) the seasonal factor dominated the effect of sowing date and manuring; mild weather at maturity reduced the sowing-date differences and encouraged manurial response while unusually warm conditions at this stage magnified the sowing-date difference and made manuring ineffective; (2) strong variety × date-of-sowing and variety × manure interactions were noted, which changed with season; (3) the 3 varieties C 281, C 24-A and C 1685 were found to possess general adaptability to the varying conditions of sowing date, soil fertility and season and were, on the whole, superior to the present specialized wheats; (4) C 273–29 gave the highest manurial response, regardless of seasonal fluctuations. F. s.—A.G.G.H.

559 Singh, R. N. **Investigations on the effects of different levels of irrigation and various levels of fertilization on the yields of wheat.** *Indian J. Agron.* 1960, **4**, No. 3, 164–70, bibl. 13. [Agric. Coll., Bapatla, Andhra Pradesh, India]

560 Bîrsan, N. Influenta îngrăşămintelor fosfatice granulate la grîul de toamnă. [**Effect of granulated phosphates on autumn wheat.**] *Anal. Inst. Cercetări agron.* 1958–59, **26**, Ser. A, 45–53, bibl. 6, Russian and French summaries. [Romania]

Results of trials made during 1954–6 demonstrated the superior effect of granulated, compared with powdered, superphosphate. The most economic dosage was 20 kg P_2O_5 per ha, which ensured an increase in wheat production of 384 kg per ha or 20%. F. Fr. s.—G.M.R.

561 Shrivastava, M. M. P. and Yawalkar, K. S. **Effect of nitrogen, phosphate and potash on lodging of wheat.** *Indian J. Agron.* 1960, **4**, No. 4, 246–57, bibl. 32. [Indian Agric. Res. Inst., New Delhi]

The effect of doses of N, P and K on lodging and the plant characters related to the tendency of wheat to lodge were studied during 1957–8. The application of 20 and 40 lb N/ac as ammonium sulphate increased the lodging index from 0·84 to 3·85 and 3·88, respectively. The effect of 20 lb N/ac on lodging was more pronounced in NP 718 than in NP 710. Phosphate application at the rate of 20 and 40 lb P_2O_5/ac increased the lodging index slightly, while 40 lb K_2O/ac reduced the lodging index compared with 20 lb K_2O. With an increased rate of N supply, the length of lowest culm internode was found to be increased, while the application of 20 and 40 lb K_2O per ac reduced the length of the lowest internode. The diameter of the upper internodes was increased with the application of 20 and 40 lb N/ac while P and K had no effect on diameter of the internodes, except that an application of 20 and 40 lb K_2O per ac significantly increased diameter of the first internode. The number of measurable internodes tended to increase with the increase in N supply while P and K dressings had no effect. Weight per unit cm of culm length of the first 2 lower internodes decreased with the application of 20 and 40 lb N/ac. On average, these doses of N reduced the weight per cm of culm length of the lowest internode by 8·29 and 28·17%, respectively. Similar doses of P_2O_5 and K_2O increased the weight per cm of culm length of both the lower internodes. N reduced the breaking strength of the lower internode while P and K increased it. With the application of 20 lb N/ac, the breaking strength was reduced by 14%, while the same dose of P_2O_5 and K_2O increased it by 23 and 40%, respectively. Lodging reduced grain yield by 15·5 and 14·7% in NP 710 and NP 718, as estimated from the average of all fertilizer treatments. F. s.—A.G.G.H.

562 Kofoed, A. D. Forskellig udbringningstid for kalksalpeter til vintersæd. [**Different times of application of calcium nitrate to winter wheat and rye.**] *Tidsskr. Planteavl* 1960, **64**, No. 1, 51–76.

At 7 locations in Denmark during 1949–57, top dressings of calcium nitrate were applied to wheat at the recommended rate (between 340 and 800 kg/ha) on 1 April, 15 April, 1 May, 15 May, in 2 equal split applications on 1 April and 15 May, and at half the recommended rate on 1 May. The N content of the wheat was highest following the latest application of calcium nitrate, and straw length was greatest following the earliest application. Grain yields are tabulated for each location. Results indicated that, in Jutland, calcium nitrate should be applied about 1 May and on the W. Islands during 1–15 May. In experiments with winter rye at 6 locations during 1949–57 calcium nitrate was applied on 20 Mar., 5 April, 20 April, 5 May, in 2 equal split applications on 20 March and 5 May, and at half the recommended rate on 20 April. N content of the rye increased with increasing delay in application of N fertilizer and there was a corresponding decrease in straw length. —S.M.J.

563 Obolensky, G. Getreidekultur und Klima. 1 und 2. Kanada. [**Cereal growing and climate. 1. Canada (Quebec, Ontario, Manitoba, Saskatchewan). 2. Canada (Alberta,**

British Columbia, Yukon, Northwest territories.).] *Qual. Plant. et Materiae veg.* 1960, **7**, No. 3, 297–323, bibl. 35, maps 7, English summaries.

Wheat production in Canada in relation to variety, climate, rainfall and soils is discussed by provinces. Cultivation of barley, flax, sunflower and soyabeans is also discussed. [See *Abs.* 958.]—R.B.

564 Institut National pour l'Étude Agronomique du Congo Belge. [**Wheat.**] *Rep. INÉAC 1959*, 1960, 405 and 511.

In a trial at Simama Station, in which wheat was grown after either maize, *Crotalaria usaramoensis*, cotton or groundnuts, the wheat after groundnuts yielded best (2258 and 2337 kg dry grain/ha), and these plots were the only ones which were free from weeds. In this area wheat is sown in Apr.–May. In 2 trials at Kisozi Station the wheat variety 130–1–77 yielded best with 2380 and 2027 kg dry grain/ha ; this variety is being multiplied.—E.B.O.

565 Daniel, G. H. **Winter wheat variety trials, 1955-58.** *J. nat. Inst. agric. Bot.*, 1959, **8**, No. 3, 577–84, bibl. 4.

In 46 varietal trials in England during 1955–8, Flamingo was the most outstanding of 6 varieties tested, consistently outyielding (by 6%) Hybrid 46, the standard variety, although weaker in the straw. —S.M.J.

566 Evans, A. W. **Spring wheat variety trials 1955-58.** *J. nat. Inst. agric. Bot.* 1959, **8**, No. 3, 585–92, bibl. 2.

The trials earlier reported in *Fld Crop Abstr.* 12 : 1650 were continued. The varieties Jufy I and Phoebus yielded significantly more than Atle ; and Jufy I significantly outyielded Koga II, whilst Phoebus yielded very slightly less. Yields, resistance to disease, length of straw, resistance to lodging, maturity and grain quality are given.—S.M.J.

567 Carson, G. P. **Descriptions of wheat varieties.** *J. nat. Inst. agric. Bot.* 1959, **8**, No. 3, 597–601, bibl. 3, illus.

Botanical descriptions are given of the wheat varieties Flamingo and Jufy I.—S.M.J.

568 Brady, J. J. **Cereal variety trials at the Department's institutions, 1957.** *J. Dep. Agric. Republ. Ire.* 1960, **56**, 56–73.

Information on varieties tested for 3 years or more is given in the summary. Spring Wheat. During 1955–7, Svenno yielded 4% less than Atle, shattered more readily, and was much more susceptible to sprouting at harvest, but it ripened earlier and was more resistant to lodging. Barley. During 1953–7 Banba (S.A.K. 115) yielded 4% more than Herta, ripened at the same time, but was less resistant to lodging on fertile soil. It was more resistant to loose smut than Herta, but more susceptible to mildew.—J.D.J.

569 Statens Forsøgsvirksomhed i Plantekultur, Denmark. Forsøg med hvedesorter 1954–1959. [**Varietal trials with wheat, 1954-9.**] *Medd. 634 Stat. Forsøgsvirk. Plantekult.* 1960, pp. 4.

In trials at 11 locations in Denmark during 1954–9 with 7 varieties of wheat, Cappelle Desprez yielded 6% more grain than the control, Weibulls Banco (53 and 50 hkg/ha, respectively), but it was not winterhardy. Sophiehøj and Svaløf Svale gave the highest straw yield (69·7 and 69 hkg/ha). Svaløf Svale had the longest straw and, together with Øtofte 56 and Weibulls Banco, was the most winter-hardy. The trial varieties, which also included Heine VII, Øtofte 56 and Weibulls Starke, are described.—S.M.J.

570 Trentin, A. Sperimentazione collegiale sul grano per la campagna 1959–60. [**Joint trials with wheat in the 1959-60 season (in Italy**).] *Agricoltura d. Venezie* 1960, **14**, No. 10–11, 460–4, illus. [Ist. Genet. e Sper. Agr., Lonigo, Italy]

A table gives the yields of 28 wheat varieties tested in 10 localities in the plain of N. Italy in 1959–60, a season when wheat yields were affected adversely by high rainfall in winter and spring. Among the varieties which yielded best were the old-established varieties Funotto, Funone, Leone, Produttore and Leonardo, and the new varieties Fortunello, A.T.M. 43, Gallini and Lo 2619.—E.B.O.

571 Vasconcellos, J. de C. Origem, expansão e aptidões das espécies de trigo cultivadas em Portugal. [**Origin, distribution and suitability of wheat species cultivated in Portugal.**] *Rev. agron., Lisboa* 1960, **43**, No. 2, 1–8, bibl. 19.

This is a review and discussion of the literature with special reference to Portugal where most of the wheats grown belong to *Triticum vulgare*, *T. turgidum* and *T. durum*. *T. polonicum* is seldom grown.—E.B.O.

572 Barradas, M. T. and Malato-Beliz, J. Como nasceram dois novos trigos. [**How two new wheats were born.**] *Agricultura, Lisboa* 1960, No. 5, 12–16, illus.

Information is given on the new wheat varieties for Portugal, Lusitano and Restauração.—E.B.O.

573 Watson, I. A. and others. **Gamenya and Mengavi : two new wheat varieties for northern N.S.W.** *Agric. Gaz. N.S.W.* 1960, **71**, Pt 8, 393–403, illus.

Two new varieties which are rust [*Puccinia rubigo-vera*] resistant and give yields at least as high as those of Gabo are described.—S.M.J.

574 NEZAMUDDIN, S. and PRASAD, L. K. **Effect of weedicides on Motha (*Cyperus rotundus*) and Bathua (*Chenopodium album*) in wheat crop.** *Madras agric. J.* 1960, **47**, No. 7, 310–16, bibl. 4. [Bihar, Sabour, India]

Cyperus rotundus was controlled significantly by spraying (3 weeks after sowing the wheat) with fernoxone (2,4-D Na), chloroxone (2,4-D Na) and spontox (2,4-D + 2,4,5-T) at 0·75 and 1·5 lb of acid equivalent per acre. *Chenopodium album* was controlled significantly by tropotox (MCPB) and by the above herbicides, in 1 out of 2 years of trials. Wheat yields from treated plots were higher than from untreated or hand-weeded plots. In one of the 2 years the increase was significant.—D.B.

575 SHAKRA, S. A. and PORTER, R. H. **Control of stinking smut (bunt) of wheat in the middle East.** *Publ. No. 11 Fac. agric. Sci. Amer. Univ. Beirut, Lebanon* 1960, pp. 17, bibl. 5.

Anticarie at 100 mg and phygon at 300–400 mg per 100 g seed effectively controlled stinking smut (*Tilletia caries* and *T. foetida*). Panogen 15 at 0·14 ml in 8 ml water per 100 g seed gave good control providing the seed was in a sealed container for 48 hr after treatment. Setrete and MEMA 4 were also effective. The varieties Florence Aurore and Senator Capelli had a high degree of resistance to *Tilletia*. F. s.—S.M.J.

576 CHOWDHRY, S. and SHARMA, R. G. **Effect of methods and frequency of irrigation on the incidence of stem borer of wheat (*Sesamia inferens* Wlk.) at Irrigation Research Farm, Madhipura.** *Indian J. Agron.* 1960, **4**, No. 4, 264–68, bibl. 4.

Borer infestation increased with an increase in the amount of irrigation water and its frequency of application.—A.G.G.H.

577 WILLIAMS, R. F. **The physiology of growth in the wheat plant. 1. Seedling growth and the pattern of growth at the shoot apex.** *Aust. J. biol. Sci.* 1960, **13**, No. 4, 401–28, bibl. 47, illus. [Div. Pl. Indust., CSIRO, Canberra]

Wheat seedlings were studied in a constant environment for the first 21 days of growth. The dry weights of leaves, leaf sheaths, stem and roots were sampled 11 times, and the pattern of dry-weight change is presented in terms of the changing ratios between plant parts. For an 11-day shoot apex, a detailed account is given of cell-size distribution along the leaf primordia and within the apex itself. It is estimated that, prior to the onset of cell enlargement, the mean cell-generation times for the young leaf primordia range from 12 hr to 3 days. An attempt is made to give an integrated picture of the early growth of the primary shoot of the wheat plant, mainly in terms of the concept of relative growth rate. The leaves and roots have a high growth rate while seed reserves are available, after which leaf growth becomes dominant. Early growth of each leaf primordium is exponential, but the exponent decreases with leaf number in a rather discontinuous manner. Following the exponential phase, the growth rates rise to maxima and then fall asymptotically to zero. It is suggested that intra-plant competition for energy substrates may play an important role in determining the pattern of development of the primary shoot of wheat. F. s.—S.M.J.

578 FLORELL, C. and RUFELT, H. **Transpiration of wheat plants cultivated under different environmental conditions.** *Physiol. Plant.* 1960, **13**, No. 3, 482–6, bibl. 3. [Inst. Genet., Univ. Uppsala ; and Inst. Physiol. Bot., Univ. Uppsala, Sweden]

Spring wheat plants were placed in a phytotron under conditions of 12-hr day length and 75% relative humidity. After 8–10 days the plants were exposed to different light intensities at 15, 20 and 25°C, and the fluctuations in transpiration measured. These fluctuations were weak at 15 and 25°C, strongest at 20°C and at low light intensities; they almost disappeared at the highest intensity (12000 Lux).—S.M.J.

579 FRIEND, D. J. C. **The control of chlorophyll accumulation in leaves of Marquis wheat by temperature and light intensity. 1. The rate of chlorophyll accumulation and maximal absolute chlorophyll contents.** *Physiol. Plant.* 1960, **13**, No. 4, 776–85, bibl. 15. [Plant Res. Inst., Canad. Dep. Agric., Ottawa, Ontario]

The rate of formation and maximal amount of chlorophyll formed in the mature first 3 leaves of Marquis wheat were controlled by the light intensity and temperature under which the plants were grown. The temperature coefficient (Q_{10}) of the rate of accumulation decreased as temperatures rose from 5–30°C. Chlorophyll formation was strongly retarded at 35°C. At light intensities above 1000 fc there was a marked interaction of light and temperature on the maximal amount of chlorophyll accumulated : at lower temperatures the chlorophyll content decreased with increasing light intensity ; at the higher temperatures it was greatest at 2500 fc ; at all temperatures, chlorophyll content increased with increasing light intensity between 200 and 1000 fc. F. s.—S.M.J.

580 FAWCETT, R. G. and QUIRK, J. P. **Effect of water-stress on the absorption of soil**

phosphorus by wheat plants. *Nature, Lond.* 1960, **188**, No. 4751, 687–9, bibl. 4. [Dep. Agric. Chem., Waite Agric. Res. Inst., Adelaide, S. Aust.]

Under conditions of the experiments, using a variety of *Triticum aestivum*, an increase in soil-water stress did not affect the rate of ^{32}P uptake by the plants, provided they were not damaged by wilting.—M.H.

581 Pálfi, G. A permetezö trágyázás hatásának vizsgálata a búza tápanyagáramoltatására. [**The effect of nutrient sprays upon the circulation of nutritive substances in wheat.**] *Agrokémia és Talaj.* 1960, **9**, No. 3, 345–56, bibl. 70, Russian and French summaries. [Agron. Exp. Inst., Szeged, Alföld, Hungary]

Winter wheat was sprayed with a 10% solution of KNO_3 (a) at earing and (b) 11 days afterwards, and the sap rising from the roots was studied for its content of N, P and K in comparison with the sap of plants sprayed with distilled water. The duration of the effect was also studied. The total content of K and N in the sprayed shoots had increased significantly 1 hr after treatment, and the 2nd spraying also increased the content of K and N. The increase was greatest on the 2nd day. The total increase in K and N content due to foliar nutrition lasted for 8 days, and the increase in the content of nitrate-N for 6 days. This increase in the content of nutritive substances in the rising sap is attributed to increased concentration of sap and especially to an increase in the quantity of sap rising. F. Fr. s.—G.M.R.

582 Delmas, Liliane. Influence de la réaction des tissus sur l'assimilation de la silice par le blé. [**Influence of tissue reaction on the assimilation of silica by wheat.**] *C. R. Acad. Sci., Paris* 1960, **251**, No. 23, 2770–2, bibl. 3. [Éc. Nat. Agric. de Grignon, Seine-et-Oise, France]

The results from investigations with wheat grown in 2 different years showed that plants which had tissues with a low pH had a higher content of SiO_2 than plants with tissues of a higher pH. It would appear that the content of SiO_2 in the tissues increases as their pH decreases during the period of high nutritive requirements of the plant.—E.B.O.

583 Wood, H. L. **A study of some carbohydrate relationships in the wheat plant and of wheat starch extracted from mottled and unmottled grain.** *Aust. J. agric. Res.* 1960, **11**, No. 5, 673–85, bibl. 34. [Chem. Dept., Univ. Qd, Brisbane]

584 Srb, V. Růst, glycidovy metabolismus a odolnost vůči suchu pšenice a hořčice ve smíšených kulturách. [**Growth, glycidol metabolism and drought resistance of wheat and mustard in mixed cultures.**] *Rostlinná Výroba* 1960, **6** (33), No. 5, 605–20, bibl. 56, German and Russian summaries. [Univ. Brno]

Triticum vulgare and *Sinapis alba* were grown in pure cultivation and in mixtures composed of: 75% wheat and 25% mustard, 50% of each component, and 25% wheat and 75% mustard. It was found that wheat grows very well in mixtures in which the proportion of mustard is smaller than that of wheat, but when the percentage of mustard is greater its effect is inhibiting. The mustard itself thrives best in combination with wheat when it comprises only 25% of the mixture, so that in this combination the mutual influence of the 2 components is stimulating and each attains high value in itself. The stimulating or inhibiting action of wheat and mustard upon one another changes during ontogeny and changes also through the influence of different proportions of the components in the mixture, and greatly affects the course of the physiological processes, especially the metabolism of glycidol and the degree of drought resistance in the two plants. F. Ger. s.—G.M.R.

585 Potocanac, J. I risultati di ricerche sulla invernalità e resistenza alle basse temperature di frumenti italiani. [**The results from investigations on the winter character and the resistance to low temperature of Italian wheats.**] *Sementi elette* 1960, **6**, No. 4, 14–22, illus., English and German summaries. [Inst. Agric., Zagreb, Yugoslavia]

Trials were carried out in 1956–60 to study the resistance to low temperature of many Italian wheat varieties which were sown in boxes, according to Aufhammer's method, during 10–20 Oct. To determine their winter character these varieties were also sown during 10–20 Apr. when the mean temperature was about 5°C, which excluded any possibility of vernalization. Results showed that the Italian wheats were on average more susceptible to cold than the local Yugoslav varieties. The varieties studied were divided into 3 groups according to their resistance to cold. The first group included the following varieties which have a satisfactory degree of resistance to low temperature and are recommended for cultivation in Yugoslavia: S. Pastore, Leonardo, S.15, Autonomia, Elia, S.13, S. Marino, Funone, Fiorello, Salto, Produttore, Vivenza and Virgilio. With the exception of Produttore and S.13, these are all varieties of winter wheat.—E.B.O.

586 Innamorati, M. Numero delle foglie e accrescimento in lunghezza nella valutazione dello sviluppo (in *Triticum durum* Desf. autunnale vernalizzato). [**Leaf number and growth in length in the evaluation of development (in vernalized *Triticum durum*, autumn**

type).] *Nuovo G. bot. ital.* 1959, **66**, No. 3, 509–54, bibl. 34, illus., English summary. [Ist. Bot. Univ. Firenze, Italy]

Seeds of *Triticum durum* cultivar Bidí were germinated in Petri dishes and then kept at 1°–2°C for 0–30 days. They were sown in the field on 13 Apr. Observations on the plants from 30 Apr. to 7 Aug. showed that : (a) the average total number of lateral stem appendices (leaves, spikelets, flower primordia and vegetative primordia) was constant and was not affected by the duration of vernalization ; (b) the speed of leaf emergence increased slightly with longer vernalization treatments, but was practically constant ; (c) above a threshold value of vernalization the speed of stem elongation increased with increasing duration of vernalization ; (d) the number of leaves formed before earing decreased slightly with increasing duration of vernalization but the differences were not always significant ; (e) the longest duration of vernalization resulted in some morphological changes.—E.B.O.

587 Razumov, V. I. and others. [**The effect of gibberellic acid on development of winter cereals.**] [Russian] *Bot. Ž., SSSR (Bot. J., USSR)* 1960, **45**, No. 12, 1732–8, bibl. 15, illus., English summary. [All-Union Inst. Pl. Industry, Leningrad]

Tests with 2 varieties of winter wheat and a winter oat confirm that GA does not affect plant development and therefore it cannot be substituted for low-temperature treatment (vernalization). However, if the seed of Ukrainka winter wheat has been vernalized for 40 and 50 days, soaking the seed in a 0·02% solution of GA accelerates the onset of earing by 14 and 4 days, respectively, the height of the plants being increased from 95 cm (control) to 144 cm after 40 days' vernalization and from 111 (control) to 143 cm after 50 days' vernalization.—M.H.

588 Disney, R. W. **The relative humidity/moisture content equilibria of wheat [grain].** *Pest Infest. Res.* 1959, 15.

OATS

See also Abs. 587, 609, 876.

589 Boken, Else. **The effect of ferrous sulphate on the yield and manganese uptake of oats on sandy soil fertilized with natural pyrolusite.** *Plant and Soil* 1960, **13**, No. 2, 128–36, bibl. 8. [K. vet. Landbohøjsk., København, Denmark]

590 Boken, Else. **On the effect of foliar applied manganese on the concentration of manganese in oat roots.** *Physiol. Plant.* 1960, **13**, No. 4, 786–92, bibl. 4. [Dept. Soil Fertil. and Pl. Nutrit., Roy. Vet. Agric. Coll., Copenhagen, Denmark]

Oats were sown on 15 April, 1959 in pots containing a sandy soil slightly deficient in Mn. Plants were sprayed with a 2% solution of $MnSO_4$ on 20 May or 3 June or on both dates. Whole plants were harvested on 13 May and at weekly intervals until 24 June and again on 10 Aug. The concentration of Mn in the roots of sprayed plants, compared with that in the roots of plants given only basic fertilizer, had increased at the time of the first harvesting 1 week after spraying, and the increase became greater as harvesting was delayed. —S.M.J.

591 Sechler, D. T. **A study of some plant characters associated with resistance to root lodging in oats.** *Diss. Abstr.* 1960, **21**, No. 1, 29–30. [Univ. Missouri, Columbia]

The lodging-resistant oat varieties Mo. 04635 and Burnett were found to develop significantly longer root-crowns, larger culm-diameters, larger root-diameters, and lower top-root ratios than the lodging-susceptible varieties Mo. 04649 and Columbia, when grown under similar conditions. Number of coronal roots or chemical content of the tissues could not be associated with lodging resistance or susceptibility. Environmental influences upon root development were investigated in a series of glasshouse tests by varying the depth of sowing, availability of moisture, seed rate, fertility level, and temperature. The only significant variety/environmental interaction was the effect of depth of sowing on the length of root-crown formation. Strains with a potential for the formation of a long root crown did not express this characteristic when sown at shallow depths.—R.B.

592 Bell, R. A. M. **Spring oat variety trials, 1954-58.** *J. nat. Inst. agric. Bot.* 1959, **8**, No. 3, 603–13, bibl. 3.

The results are given of 54 trials held throughout Gt Britain during 1954–8 on the spring-oat varieties Manod, Nestor, Zandster, 16004 and 4757/6/2/19, with Sun II as control. Manod had a marked resistance to mildew [*Erysiphe graminis*] and crown rust [*Puccinia coronata*], and yielded relatively better than Sun II at centres where incidence of either or both of those diseases was high. Zandster and 16004 had weaker straw than the control. Nestor gave a yield similar to that of Sun II but was inferior in grain quality. Grain quality and yields are tabulated.—S.M.J.

593† Dent, J. W. **The composition and yield of the spring oats Radnorshire Sprig, Maldwyn and Sun II grown for fodder under upland conditions.** *J. nat. Inst. agric. Bot.* 1959, **8**, No. 3, 614–24, bibl. 5.

During 1955–7, the spring-oat varieties Radnorshire Sprig, Maldwyn and Blenda [Sun II in the title should read Blenda] were grown in trials at 4 upland and 2 lowland centres. They were harvested at the hay or milk-ripe stage and the binder-ripe stage. At the hay stage there were negligible differences in chemical composition between varieties grown under similar conditions, and between varieties in composition of the straw at the binder-ripe stage. At both stages Radnorshire Sprig yielded a finer, softer straw than the other 2 varieties and had a higher grain protein content. Differences in composition due to environment were much greater than those due to variety. Upland centres consistently produced a straw of higher protein and lower fibre content than did the lowland centres. Blenda and Maldwyn usually gave the highest dry-matter yield at both stages of cutting except at 2 upland centres in Wales where total yields of all varieties were approx. equal. F. s.—S.M.J.

594 MENGERSEN, F. **Oat improvement in N.S.W. 1. Early history and development. 2. Development of new varieties in southern New South Wales.** *Agric. Gaz. N.S.W.* 1960, **71**, Pt 9, 449–61, bibl. 12, illus. [Agric. Res. Inst., Wagga]

595 BUCHHOLTZ, K. P. **The response of oats to applications of amitrol.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 48–9. [Univ. Wisconsin, Madison] [Received May, 1960]

When Beedee oats were treated at the tillering stage, applications of 2 lb amitrol/ac in 1958 and 4 lb/ac in 1959 were required to reduce yields significantly. In 1958, Beedee oats recovered more completely from applications made at the seedling stage than from those made at the tillering or heading stages. There was little difference in sensitivity at the 2 later stages. In 1959, Clintland 60 was injured more severely by treatments made at the tillering stage than by those made at the heading stage. When treated at the tillering stage, Beedee oats were more tolerant of amitrol than Clintland 60, but the difference was less apparent at the heading stage.—A.M.H.

596 NUORTEVA, P. Om bollnässjukans natur. **Timothy seed cultivation as a cause of the phytotoxicity of the leafhopper *Calligypona pellucida* (F.) to oats.** *Nord. JordbrForskn.* 1959, **41**, No. 1, 25–31, bibl. 21, English summary. [Univ. Helsinki, Finland]

Study of the injury to oats by *Calligypona pellucida* in some restricted areas of Fennoscandia [Norway, Sweden and Finland] shows that the injury is directly caused by the salivary toxins of the insects. The composition of the salivary secretions depends on the nature of the food available. Feeding experiments with adult leafhoppers have suggested the existence, in areas with oat damage, of a food-plant able to induce the production of phytotoxic substances in the salivary glands of the leafhopper. Statistics collected in Finland show that the area of oat damage is roughtly identical with the area to which the cultivation of timothy seed is confined, and the damage to oats was greatest in years when the cultivation of timothy seed was most intensive. It has been observed that in the area of oat damage *Calligypona pellucida* occurs in timothy fields before migrating to the oat fields. It may be concluded that the cultivation of timothy seed is very probably the cause of the phytotoxicity of *C. pellucida* to oats. F. Eng. s.—G.M.R.

597 GRIFFITHS, D. J. and PEREGRINE, W. T. H. **Control of halo blight in oats.** *Plant Path.* 1960, **9**, No. 1, 10–14, bibl. 6. [Welsh Pl. Breed Sta., Aberystwyth]

In 1957, oat seed inoculated with halo blight (*Pseudomonas coronafaciens*) was incubated for 24 hr (1) before and (2) after soaking in : (a) 50 i.u. streptomycin/ml ; (b) 200 ppm. aureomycin ; (c) 1 pt formalin in 40 gal water ; (d) water at 35°C for 4 hr followed by water at 51–52°C for 10 min. and then rapid cooling ; (e) 200 ppm. agrimycin ; (f) 200 ppm. terramycin. Treatment (a) was the best ; it resulted in 0·86% infected seedlings per plot when seed was incubated after treatment, and no infected seedlings when incubated before treatment.—S.M.J.

598 IKENBERRY, G. J. **Developmental vegetative morphology of *Avena sativa*.** *Diss. Abstr.* 1960, **20**, No. 7, 2513. [Iowa State Univ., Ames]

599 GUL, A. and KOLP, B. J. **Accumulation of nitrates in several oat varieties at various stages of growth.** *Agron. J.* 1960, **52**, No. 9, 504–6, bibl. 10. [Wyoming Agric. Exp. Sta., Laramie]

600 HAMMES, J. K. and BERGER, K. C. **Manganese deficiency in oats and correlation of plant manganese with various soil tests.** *Soil Sci.* 1960, **90**, No. 4, 239–44, bibl. 10. [Univ. Wisconsin]

Available soil Mn, extracted by 4 chemical methods, was correlated with Mn content of oats. Results indicated that Mn-deficiency in oats can be expected when the soil Mn extracted with H_3PO_4 is less than 20 ppm. This method of extraction was the most reliable and easiest to use. Young oat plants containing less than 30 ppm. Mn are likely to be Mn-deficient whereas mature grain having a Mn content of less than 12 ppm. is regarded as deficient. Mn-deficiency in oats was

corrected by a single foliar spray application of $MnSO_4$ at 5 lb in 15 gal of water per ac, or by dressing the soil with $MnSO_4$ at 25 lb, mixed with a 4–16–16 fertilizer at 250 lb per ac and drilled with the seed. F. s.—E.B.O.

601 Moule, C. Maturation de l'amande et échaudage chez l'avoine cultivée. [**Seed maturation and shrivelling in cultivated oats.**] *Ann. Amélior. Pl., Paris* 1960, **10,** No. 1, 5–51, bibl. 11, English, German and Russian summaries. [Sta. Amélior. Pl., Versailles, France]

The growth and maturation of the seed of 3 varieties of spring oats were studied over a 5-year period, during which heat waves of 30°C or more occurred. The fresh- and dry-weight of the seed and its water content were measured every day or every other day. It was found that, when water is not a limiting factor, the maturation of oat seeds takes place in 3 main stages during which the laws of dry-matter growth are of an exponential type ; the weight of dry matter produced depends mainly on conditions at the beginning of a stage (weight of the fertilized ovary for stage 1), on temperature and light. The following conclusions were drawn with regard to the changes in dry matter and water content after a heat wave. (a) The temperature at which shrivelling occurs is dependent on the rainfall of the period ; shrivelling is therefore related to drought ; at Versailles it usually occurs in spring oats when a temperature of 30°C or more lasts for 2 days, but in 1959 28°C had the same effect as 34°C in 1957. (b) Shrivelling can occur at any stage of maturation, but it is most serious during the 10–11 days (2nd stage and later) when the seed-moisture content is highest. (c) Shrivelling can slow down the production of dry matter and even accelerate the passage from one growth stage to another.—E.B.O.

602 Peers, F. G. and Daniels, D. G. H. **Germination inhibitory substances in oat husk.** *W. Afr. J. biol. Chem.* 1958, **2,** No. 1, 9–14, bibl. 18. [Cereals Res. Sta. St. Albans, England] [Seen Jan., 1961]

603 Grafius, J. E. and Kiesling, R. L. **The prediction of the relative yields of different oat varieties based on known environmental variables.** *Agron. J.* 1960, **52,** No. 7, 396–9, bibl. 5. [Michigan Agric. Exp. Sta., East Lansing]

Five vector sets composed of 22 varieties of oats grown under 5 different environments were picked to represent the effects of high night-temperature, low night-temperature, drought, lodging, and a composite effect of certain races of both stem- and leaf-rust. These 5 vectors were used to construct 5 orthogonal basis vectors. It was found that these 5 vectors could be used to predict the relative yield of the same 22 varieties for 9 other environments with a measurable degree of success. An important consideration for this method is that one may use long-term records of temperature, rainfall, lodging and specific diseases for a given locality to estimate varietal performance. Thus varietal recommendations could have a long-term average base but not be based on long-term varietal averages. F. s.—R.B.

RYE

See also Abs. 562.

604 Pagel, H. Über den Einfluss von Humusstoffen auf das Pflanzenwachstum. 2. Einfluss von Humusstoffen auf Ertrag und Nährstoffaufnahme. [**The effect of humic substances on plant growth. 2. The effect of humic substances on yield and nutrient uptake.**] *Albr.-Thaer-Arch.* 1960, **4,** No. 7, 493–506, bibl. 3, English and Russian summaries. [Inst. Bodenkunde u. PflErnähr., Humboldt Univ., Berlin]

In sand- and water-culture experiments, humic acid and sodium humate increased dry-matter yields of rye plants by 20–30% when grown in an optimal nutrient medium and by 50% in an inadequate one. In young plants, the increase was especially marked in the roots. Humic substances caused an increase in the intake of K and of P_2O_5. An increase in uptake of nutrients and in yield was also obtained by soaking seeds in humic acid solution before sowing. Humic acid appears to function by changing the enzyme system and the permeability of protoplasm. F. s.—D.B.

BARLEY

See also Abs. 555, 568, 887.

605 Foltýn, J. Doba setí ozimého ječmene. [**When to sow winter barley.**] *Rostlinná Výroba* 1960, **6,** (33), No. 5, 575–80, Russian and German summaries. [Agric. High School, Prague]

For physiological reasons winter barley is especially sensitive to inclement weather, particularly towards the end of winter. In Czechoslovakia, the sowing date must ensure good growth before winter sets in. Plants with good tillering develop well in the early spring. The risks attending too early and too late sowing are outlined, the latter being the more dangerous. Once the latest limit of safe sowing has been determined, efforts should be made to sow within 14 days before this limit is reached. But if the autumn has been very dry, winter barley should be replaced by another crop, say, winter wheat or spring barley. F. Ger. s. —G.M.R.

606 Pohjanheimo, O. and Heinonen, R. **The effect of irrigation on root develop-**

ment, water use, nitrogen uptake and yield characteristics of several barley varieties. *Suom. Maataloust. Seur. Julk.* 1960, **95**, No. 6, 1–20, bibl. 9, illus. [Agric. Res. Centre, Jokioinen (O.P.) ; and Univ. Helsinki (R.H.)]

An irrigation experiment combined with a trial of 7 barley varieties was carried out on the clay loam soil of Jokioinen, Finland, in the dry summer of 1959. Typical of the area was the rapid drying of the plough-layer during the dry period of the early summer, a factor which might entirely inhibit the penetration of the roots into the subsoil. Irrigation in June through a perforated pipe supplying river water, by which the entire plough-layer was moistened, helped the barley plants to develop a root system at greater depth, to give a yield increased by 2·4-, to 2·9-fold (grain) and by 2·2- to 4·7-fold (straw). The N yield of the Balder (control) variety was 155 and 54 kg/ha for the irrigated and unirrigated plots, respectively. The increases in crop yield produced by irrigation came about through more abundant tillering in the first place ; increase in the number of grains per ear and in grain weight is also partly responsible. In these respects, as well as in the protein content of the grains, differences can be noted between the different varieties, which are primarily attributable to their different capacity for tillering. F. s.—G.M.R.

607 Norfolk Agricultural Station. **Rate and time of application of nitrogen for spring barley.** *Rep. Norfolk agric. Sta., 1959-60* 1960, No. 52, 8–9.

During 1957–9 plots of spring barley, grown after wheat, received 15% nitrochalk applied at 0, 2, 4 or 6 cwt/ac, either as 1 application broadcast on the seedbed, or as an early or a late top-dressing, or as 2 or 3 split applications applied in all possible combinations of the 3 times of application. A basal PK compound (not specified) was applied to the whole trial area during seed-bed cultivations. In 1957, an economic and significant response was obtained even up to the 6 cwt level of nitrochalk but in 1958, a cold and wet season, this 6 cwt rate resulted in severe lodging and depressed the yield below that given by 4 cwt of nitrochalk. In 1959, a dry year, no dressing above 2 cwt could be utilized by the crop, due to shortage of water. The highest yield and best malting qualities were obtained where all the N was applied to the seed bed. Both yields and quality declined with late top-dressings and were lowest when N was applied in mid-May. An application of 2 cwt nitrochalk/ac is recommended, except where the fertility status of the soil is low, e.g. after wheat.—S.M.J.

608 Institut National pour l'Étude Agronomique du Congo Belge. [**Malting barley.**] *Rep. INÉAC 1959* 1960, 451. [Centre Exp. de la Ndihira, N. Kivu]

In a trial on poor soil, the malting barley variety Research yielded best giving 1107 kg dry grain/ha. In another trial the varieties Carlsberg, Research, Parkland and Australiana yielded 2820, 2572, 2480 and 2307 kg dry grain/ha, respectively. Research was best for grain quality.—E.B.O.

609 Nordisk Jordbrugsforskning. Resultater av nordiske fellesplaner for bekjempelse av ugras i kornåker. [**Results of the associated Scandinavian plan for the control of weeds in grain fields.**] *Nord. JordbrForskn.* 1960, Suppl. 1, 127–31.

In experiments carried out in Denmark on stands of barley containing 5·1% weeds, applying MCPA increased grain yields by 0·9 hkg, while DNOC, which is known to have a growth-stimulating effect, increased yields by 1·9 hkg yet gave no better weed control [rates of herbicide not given]. A mixture of the 2 chemicals, at full strength, gave good weed control. DNOC reduced the yield of an oat crop containing 3·1% weeds. In trials in Finland, MCPA at 1–1·5 kg/ha increased grain yields of cereals by 5–15%. In Norwegian trials, *Stellaria media* and *Spergula arvensis* were best controlled with MCPA plus dinoseb, and *Polygonum* spp. with MCPA plus DNOC.—R.B.

610 Das, N. **Leaf analysis as a means of crop nutrition studies. 1. Effect of phosphate supply on the growth, yield and composition of *Hordeum vulgare* L.** *J. Indian bot. Soc.* 1959, **38**, No. 3, 338–52, bibl. 40. [Dep. Bot., Univ. Allahabad, India] [Seen Jan., 1961]

611 Michael, G. and others. Die Verteilung von spät gedüngtem ^{15}N in der reifenden Gerstenpflanze unter besonderer Berücksichtigung der Korneiweisse. [**Distribution of ^{15}N when applied late to ripening barley with special reference to grain protein.**] *Z. PflErnähr. Düng.* 1960, **91**, No. 2, 158–69, bibl. 6. [AgrikChem. Inst., Univ. Jena, E. Germany]

MAIZE

See also Abs. 656.

612 Attlee, P. **Maize. What we know and what we don't : a complete guide to growing and feeding.** *Fmrs' Wkly, Lond.* 1961, **54**, No. 6, 96–9, illus.

This is a review of maize-growing for silage in England.—G.L.S.

613† Eddowes, M. **Maize as a silage crop.** *Tech. Bull. 3 Harper Adams agric. Coll.* 1960, pp. 14, bibl. 4, 3s. 6d.

An account is given of growing maize for silage on a commercial scale in the English West Mid-

lands during the contrasting seasons of 1959 and 1960. Yields of green matter ranged from 20 – 25 tons in 1959 to 25 – 31 tons per acre in 1960. In both years the yield of dry matter was from 4 to over 5 tons per acre. Advice is given on sowing dates, seed rate, plant population, manuring, the use of herbicides, the avoidance of frost and harvesting the crop. F. S.—A.G.G.H.

614 Institut National pour l'Étude Agronomique du Congo Belge. [**Maize.**] *Rep. INÉAC 1959*, 1960, 311, 343, 369, 378, 384–5, 480, 512 and 523.

The maize synthetic variety GPS 2 was multiplied at Gandajika Station for distribution to farmers ; the maize variety Kisozi was multiplied in the high-altitude regions of Urundi, and the varieties Blanc Gemena, Jaune Gemena and Finkoni at Boketa Station. At Mont Hawa Station, the Gandajika hybrids yielded best (an average of 2726 kg dry grain/ha). At the Experimental Centre of Rwerere the varieties Golden Corn (Nioka), Kisozi and Bambou yielded 2307, 2063 and 2022 kg dry grain/ha, respectively. At Lubarika Station the values of average daily evapotranspiration for maize were 4·39 mm in the wet season and 4·84 mm in the dry season. At the Experimental Centre of Bena Longo, Kasai, maize sown on 15 Aug. yielded more grain than maize sown on 1 and 15 Sept. In a spacing trial with fodder maize at Keyberg Station, the best spacing, for yield and mechanized harvesting, was in twin rows 30 cm apart with 75 cm between each 2 pairs of rows.—E.B.O.

615 Pumphrey, F. V. and Dreier, A. F. **Grain, silage and plant population experiments with corn hybrids at the Scotts Bluff Experiment Station.** *Bull. SB 449 Nebraska agric. Exp. Sta.* 1959, pp. 19, illus.

In western Nebraska, maturation period is the most important aspect of maize yields. Many available hybrid varieties mature at the right time and yield well, but some mature too early, so that their yield is below the potential for the season. The majority are objectionably high in grain moisture at harvest. Later-maturing varieties produce the highest yields of green forage. All varieties require plant populations of 15,000 per acre, and 20,000 can be sustained where conditions are favourable. —J.D.J.

616 Grigor'jan, B. B. [**Growth and development of maize, depending on method of sowing and stand density.**] [Russian] *Doklady Akad. Nauk Azerbaïdžan. SSR* (*Proc. Acad. Sci. Azerbaïdžan SSR*) 1960, **16**, No. 4, 381–5.

In Azerbaïdžan, maize is sown usually in either widely spaced rows or the square-pocket method, with different widths between the rows of pockets. The effect of these methods on maize growth and development has been tested at the Karabah Sci. Expt. Base [40°N., 46°E.] using the varieties VIR-42 and the local late-ripening flint type Zakatal'skaja Želtaja. Following certain cultural treatments, the plots of 100 sq.m were sown (3 replications) with distances of 70 × 70, 70 × 45, and 60 × 20 cm at 31 to 83 thousand plants per ha (1 to 3 per pocket). The data show that for VIR-42 the best yields of green matter were 36,250 kg/ha harvested at milk/wax ripeness, with 60 thousand plants/ha, on the scheme 70 × 70 (3 plants per pocket), and 36,900 kg/ha on 70 × 45 cm scheme (2 plants per pocket). Yield of grain with 14% moisture was greatest (6690 kg/ha) with about 50 thousand plants per ha (70 × 70 cm and 2 or 3 plants per pocket), or on 70 × 45 cm and 1 or 2 plants per pocket (6170 kg/ha). The data for the Zakatal'skaja Želtaja under similar conditions to those of VIR-42 show that highest yields of green matter (62,240 kg/ha) were obtained with 50 thousand plants per ha, 2 or 3 plants per pocket on the plan 70 × 70 cm. A grain yield of 7098 kg/ha was obtained with 40 thousand plants per ha, 2 plants per pocket on the plan 70 × 70 cm.—M.H.

617 Lanza, F. and others. Densità d'investimento nelle coltivazioni di mais. Nota preliminare. Correlazioni tra numero di spighe/mq, peso granellare di spiga e resa/ha nelle parcelle di controllo resa per tipi e per concimazione. [**Plant density in maize crops. Preliminary note. Correlations between number of cobs/m², cob grain weight and yield/ha in plots to study yield of different maize types with different fertilizers.**] *Maydica* 1960, **5**, No. 4, 115–27, bibl. 16, English and German summaries.

From this investigation with the maize hybrids US 13, Iowa 4316, Wisconsin 641 AA and QV 396 it is concluded that the yield of grain per ha is influenced more by the cob grain weight than by the number of cobs/m².—E.B.O.

618 Şipoş, G. Influenţa spaţiului de nutriţie asupra producţiei la porumb. [**The effect of the nutrition area on the productivity of maize.**] *Anal. Inst. Cercetari agron.* 1959/60, **27**, Ser. B, 9–19, bibl. 15, Russian and French summaries.

Results of trials conducted in 1956–8 indicate that the optimum plant density for maize varies according to the earliness of the variety or hybrid grown. It was found to be from 28 to 35 thousand plants/ha for the variety Lester Phister and the hybrids Pioneer 332 and Wisconsin 641 AA, and from 35 to 40 thousand plants/ha for the more early hybrids Romînesc de Studina × Lester Phister and VIR-42. A close correlation exists between plant density and yield per plant and per ha. Increasing the distance between rows from

60 to 70 or 100 cm, without altering the number of plants per ha, results in an insignificant change in the yield obtained, namely, a 3% increase with the 70-cm rows and a 2% decrease with the 100-cm rows. Increasing the distance between rows still more produces a steady loss of yields, amounting to 7% with 140 cm between rows and 16% with double rows 240 cm apart. In view of the advantages of mechanization, the probable value of increasing the distance between rows from 70 to 90 or 100 cm is suggested. Increasing the number of plants per pocket (2 and 3 instead of 1) does not modify yield above the level of experimental error. F. Fr. s.—G.M.R.

619 Nandpuri, K. S. **Studies on the effect of different plant populations and nitrogen levels on the yield and protein content of corn [maize] grain.** *Indian J. agron.* 1960, **4**, No. 3, 171–75, bibl. 12. [Agric. Coll., Bapatla, Andhra Pradesh, India]

620 Vasiliu, M. and Davidescu, D. Aplicarea îngrăşămintelor pe faze de vegetaţie la porumb în condiţii de irigaţie la Staţiunea Chiscani. [**Application of fertilizers at different phases of the growth of irrigated maize at the Chiscani Station.**] *Anal. Inst. Cercetări agron.* 1958–59, **26**, Ser. A, 141–53, bibl. 8, Russian and French summaries. [Romania]

In experiments made during 1955–7, it was found that the best times to apply N, P and K to irrigated maize were : (1) during tillage, before sowing ; (2) when the 3rd leaf appeared ; and (3) when the male inflorescence appeared. In irrigated crops, P and K applied during the growth period resulted in better yields than when they were applied as basic manure. F. Fr. s.—G.M.R.

621 Balla, A. A trágyázás hatása a kukorica termésére és táplálóanyagtartalmára. [**The effects of fertilizers on the yield and composition of maize crops.**] *Agrokémia és Talaj.* 1960, **9**, No. 3, 307–22, bibl. 25, English and Russian summaries. [Inst. Soil Res., Hungarian Acad. Sci., Budapest]

Four-year manurial trials showed maize to respond well to fertilizers, the average increase of seed and stalk yield being 13% and 25 – 30%, respectively. The total increase in nutritive value due to manurial treatment was estimated as about 24 – 30% N, 22 – 27% P, and 28 – 42% K. There are details of the results obtained from f.y.m. and the different mineral fertilizers used. F. Eng. s.—G.M.R.

622 Thomas, W. **The effect of foliar applied nitrogen, phosphorus and potassium on the growth and composition of corn [maize].** *Diss. Abstr.* 1960, **20**, No. 7, 2477–9. [Ohio State Univ., Columbus]

623 Teater, R. W. and others. **Yield and mineral content of corn as affected by ammonium chloride fertilizer.** *Agron. J.* 1960, **52**, No. 7, 403–5, bibl. 13. [Ohio Agric. Exp. Sta., Wooster]

Ammonium chloride was compared with ammonium sulphate and ammonium nitrate as a source of N in a series of field experiments with maize. Maize yields were not affected by relatively high rates of Cl, i.e. up to 90 lb/ac applied in the row or 540 lb/ac broadcast. Yield was significantly decreased, below that given by comparable levels of N from sources with low Cl content, by 120 lb Cl/ac applied in the row in 1956 but not in 1957. The Cl content of the plant increased with increasing rate of Cl application ; however, this increase in the Cl content of the plant had no significant effect on N-, P- or K-content. The amount of Cl accumulating in the topsoil after 2 years of heavy fertilization with ammonium chloride was relatively insignificant, since Cl was leached from the soil during winter. Applications of ammonium chloride increased soil acidity to the same extent as equivalent rates of ammonium sulphate. Results indicated that there should be no problem associated with the use of ammonium chloride as a fertilizer for maize in Ohio. F. s.—R.B.

624 Paris, P. Sulla concimazione del mais. II contributo : equilibri ionici ed efficacia del letame nell'utilizzazione dell'azoto. [**Maize manuring. 2nd contribution : ionic equilibria and effectiveness of f.y.m. in N utilization.**] *Ann. Fac. Agr., S. Cuore* 1960, **79**, No. 3, 28–45, bibl. 16, English and French summaries.

This article is based on manurial trials on maize in 1959 in Cremona province, N. Italy. [For a first report on these trials see *Fld Crop Abstr.* 13 : 1672.] The ionic equilibrium 70% NO_3 + 14% PO_4 + 16% K was better than the others tested.—E.B.O.

625 Eĭhe, E. [**The requirements of maize regarding the water regime of the soil.**] [Russian] *Izv. Akad. Nauk Latviĭsk. SSR* (*Bull. Acad. Sci. Latvian SSR*) 1960, No. 7 (156), 213–18.

In recent years increasing interest has been shown in maize for silage in Latvian SSR. This crop is adversely affected by both a surplus or deficiency of water, although it is relatively drought-resistant and is more economical in its water expenditure (transpiration coefficient = 1 : 260) than spring wheat, cotton, sunflower or lucerne, the transpiration coefficients of which are 1 : 436, 1 : 465, 1 : 569 and 1 : 664, respectively, when grown under the same conditions. The author's observations indicate that the most suitable water regime for maize at sowing time (spring) is that which results from a ground-water level of 50 – 60 cm and soil moisture at 65 – 70% of the

maximum moisture-holding capacity. Maize is also sensitive to soil temperature and aeration, for the adjustment of which drainage operations may be necessary in Latvia.—M.H.

626 MYNBAEV, T. **[Uneven growth and development in maize, depending on variety.]** [Russian] *Izv. Akad. Nauk Kazah SSR* (*Bull. Acad. Sci. Kazah SSR*) 1960, No. 3 (9), 54–61, bibl. 5.

Growth of maize is frequently uneven in sowings whether only one or several varieties are used. The author's study was made in 1958–9 with maize grown from grain of different origins on field plots at the Džezkazgan Dept of the Botanical Institute, Acad. Sci. Kazah SSR [48°N., 68°E.]. The climate of the Džezkazgan desert area is continental, with a frost-free period of 120 days. The seed was sown by hand on plots of 70 × 70 cm, and growth was recorded for individual plants at seedling emergence, flowering, cob formation and at milk- and wax-ripeness. Uneven growth in different degrees was observed in all varieties and was especially uneven in those of hybrid origin. There is tabulated information on variation in yields of green matter and of grain for 14 varieties. —M.H.

627 VINOGRADOVA, A. P. **[Removal of branch tillers of maize grown in the non-chernozem zone.]** [Russian] *Kukuruza* (*Maize, USSR*) 1960, **5**, No. 8, 15–17.

In maize, tillering and the formation of branched tillers may, from an agricultural viewpoint, have either a desirable or undesirable effect. It has been postulated that while branching of the tillers results in a good harvest of green matter, it not only hinders growth of the main stem but also retards development of the cobs and grain ripening. The author studied the translocation of nutrients through the maize plant by means of ^{32}P and there was evidence that, under conditions of the test with 3 varieties (2 replications for 2 varieties and 3 for the 3rd), during 1 day, ^{32}P was translocated to all parts of the plant through the roots of the main stem and of the tiller branches. However, nutrients supplied through the roots only of the main stem reached the tiller branches more quickly and in much greater amounts compared with the quantities in the main stem when the supply was through the roots of the tiller branches only. It is therefore concluded that the tiller branches draw off nutrients from the main stem, thereby weakening it and retarding development of the cob. An additional study was made to determine which among 23 maize varieties form branched tillers when grown in the non-chernozem zone. The data show that in the Moscow region the early varieties have the greatest tillering capacity and form numerous branched tillers. In some of the plots the branched tillers were removed and subsequently the plants grew taller and cob formation was accelerated. During 1956–9 a field test was made (3 replications) with the varieties Sterling and Voronežskaja 80 to determine the effect on yields of removing the branched tillers. Green yields were increased by 15% and cob yields by 37 or 38%, the early Voronežskaja 80 attaining milk/wax ripeness in the Moscow Province. It is stressed that the method of removing the tillers is arduous and unsuitable for the production of maize crops in mechanized agriculture. However, the method is practicable in small plots for selection work, and in the non-chernozem zone non-tillering varieties of maize should be used.—M.H.

628 SAXENA, P. N. and MEHTA, R. P. **Studies on the estimation of yield of maize by sampling in field experiments.** *Indian J. Agron.* 1960, **4**, No. 4, 211–21, bibl. 17. [Indian Agric. Res. Inst., New Delhi]

Sampling-technique studies for estimating maize grain yields were carried out during 1956–8. Sampling for the ratio of grain to total produce proved to be superior to sampling directly for grain yield, whether the samples were taken before or after harvesting the crop. A 10% sample taken twice from each plot was shown to be the optimum sampling unit with a percentage standard error of 3 – 4%. F. S.—A.G.G.H.

629 KNAKE, E. L. **The effects of competition from various intensities of *Setaria faberii* Herrm. growing with corn and soybeans.** *Diss. Abstr.* 1960, **20**, No. 12, 4482–3. [Univ. Illinois, Urbana]

Maize grown at 13,000 plants/ac, and Hawkeye soyabeans grown in 40-in. rows were infested with *Setaria faberii* at the following rates : (a) no weeds ; one weed per (b) 24, (c) 12, (d) 4, (e) 2, (f) 1 in. of row ; (g) 54 weeds per ft of row in a band 4 in. wide. Weeds were left growing only in the crop rows. Dry-matter yields of crop plus weeds were similar in all treatments. Yields of maize in bu/ac were : (a) 93·5, (b) 90·4, (c) 86·4, (d) 85, (e) 82·1, (f) 78·4, (g) 70·6. Yields of soyabeans in bu/ac were : (a) 38·5, (b) 37·1, (c) 36·8, (d) 36·2, (e) 34·6, (f) 31·9, (g) 27·6.—R.B.

630 ANDERSON, L. E. **Chemical weed control in corn.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 52. [Kansas State Univ., Manhattan] [Received May, 1960]

In 1957–9, soil moisture at and immediately after the time of application of herbicides greatly influenced the final results. Maize yields and weed counts following treatments with 6 herbicides in 1959 are tabulated. Randox (CDAA) and falone

gave highly satisfactory weed control until late summer. Atrazine applied after emergence did not control annual grasses. Simazin controlled weeds throughout the growing season and gave significant increases in maize yields. In dry conditions in 1958, simazin-treated plots yielded significantly less than the controls.—A.M.H.

631† Eddowes, M. **The control of weeds in maize.** *Tech. Bull. 4 Harper Adams agric. Coll.* 1960, pp. 14, bibl. 2.

Pre-emergence weedkillers simazin and atrazine were compared with post-emergence MCPA in 1959, and with 2,4-D amine and MCPA in 1960, when applied to maize grown for silage. In both seasons simazin and atrazine gave excellent control of annual weeds, but had no significant effect on perennial weeds or self-sown potatoes. Post-emergence MCPA and 2,4-D amine gave adequate control of a range of annual weeds, and broad-leaved perennials. Areas sprayed with simazin and atrazine gave significantly greater yields and ear weights than unsprayed areas. Compared with adjacent areas of the crop sprayed after emergence with 2,4-D amine and MCPA, those sprayed with simazin produced a higher yield, more tillers, but fewer and lighter ears. This may have been due to differences in weed control, but suggests that simazin stimulates vegetative growth of maize at the expense of reproductive growth. Harrowing immediately after the pre-emergence application of simazin was detrimental to weed control. Atrazine applied after emergence failed to check annual weeds significantly. The timing of spraying with 2,4-D and MCPA appears to be critical if damage to the crop is to be avoided. 2,4-D amine applied at 1 lb a.e. in 20 gal of water/ac, at the 4-leaf stage, when the maize is 4 – 5 in. tall, should normally give adequate weed control for less than 10/- per ac. Simazin at 2 lb 50% W.P. is very effective in moist soils. It should be especially valuable in the western half of the country, and against annual weeds resistant to 2,4-D. The cost is about £4 per ac. Atrazine is not commercially available. F. s.—A.G.G.H.

632 Schneider, E. O. **Comparison of simazine and atrazine for weed control in corn.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 52–3. [Received May, 1960]

Maize was equally tolerant to simazin and atrazine. Simazin was of little use as a post-emergence herbicide, but atrazine performed favourably if applied at about 2 lb/ac to weeds and grasses when not more than 1·5 – 2 in. high. Atrazine was more effective than simazin in controlling velvet leaf (*Abutilon theophrasti*). Simazin gave better control of barnyard grass (*Echinochloa crus-galli*), *Panicum* and crabgrass [*Digitaria sanguinalis*]. The greater solubility of atrazine made it more effective than simazin under dry conditions.—A.M.H.

633 Frans, R. E. **Formulation and incorporation effects of pre-emergence herbicides on corn.** *Proc. S. Weed Conf.* [*USA*] 1960, **13,** 32–8, bibl. 5. [Arkansas Agric. Exp. Sta., Fayetteville]

Of 5 herbicides used for pre-emergence treatment in maize, simazin at 2 lb/ac and diuron at 1 lb/ac gave satisfactory weed control for 9 weeks after sowing. Control with the iso-octyl ester of 2,4-D at 4 lb/ac was comparable, but injury to the maize was excessive. Rates of 1 and 2 lb 2,4-D/ac gave satisfactory control for 4 weeks after sowing. There were no significant increases in effectiveness when herbicides were incorporated in the soil or used in granular forms. Granular simazin was less effective than a spray preparation. Soil incorporation reduced the effectiveness of simazin, diuron and 2,4-D. F. s.—A.M.H.

634 Moore, G. D. **Experimental evaluation of herbicides for weed control in commercial corn and sorghum [seed] production.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W Canad. Weed. Contr. Conf.* 1959, 51–2. [Received May, 1960]

635 Simón, F. J. E. and Arellano, M. Control del barreno del maíz (*Diatraea saccharalis*) con insecticidas orgánicos. [**Control of corn borer (*D. saccharalis*) with organic insecticides.**] *Agronomía, Lima* 1960, **27,** No. 1, 79–83, bibl. 3. [Est. Exp. Agríc. La Molina, Peru]

In plot trials to study the control of *D. saccharalis* on maize, endrin at 500 g/ha was best, resulting in an average of 6% infected plants, against 22% in the untreated controls.—E.B.O.

636 Corona, A. O. **Survival of the European corn borer, *Pyrausta nubilalis* (Hubn.), on susceptible and resistant corn hybrids grown at five different nitrogen levels.** *Diss. Abstr.* 1960, **21,** No. 1, 277. [Ohio State Univ., Columbus]

The maize hybrids Oh43 × Oh51A and Wf9 × M14, which are, respectively, resistant and susceptible to *P. nubilalis*, were grown in the open in gravel culture with 10, 50, 100, 200 or 300 ppm. N. Plant growth was most vigorous at 200 ppm. N. The rate of survival of first-generation *P. nubilalis* larvae on the resistant variety was very low and not related to level of N. On susceptible plants, and in the case of second-generation larvae on resistant plants, larval survival was greatest at between 100 and 200 ppm. N.—R.B.

637 Walker, P. T. **The relation between infestation by the stalk borer, *Busseola***

fusca, **and yield of maize in East Africa.** *Ann. appl. Biol.* 1960, **48**, No. 4, 780–6, bibl. 17. [Colonial Pesticide Res. Sta., Porton Down, Salisbury, England]

638 Rogers, B. J. **The action of arsenic on germination and seedling growth.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 20. [Purdue Univ., Lafayette, Indiana] [Received May, 1960]

The effects were studied of sodium arsenite and arsenate on germination and subsequent root growth in maize. The arsenite was 10 times more toxic than the arsenate, and sensitivity of maize to these compounds was dependent on genetic constitution.—D.B.

639† Bulat, Helene. Experimentelle Beiträge zur Feststellung der Keimfähigkeit bei hitzebehandeltem Mais. [**Experiment to determine the viability of heat-treated maize seed.**] *Saatgut-Wirtsch.* 1960, **12**, Nos. 4 and 5, 102–4 and 134–5, bibl. 16. [Inst. Samenkunde, Stuttgart/Hohenheim, W. Germany]

When seed of maize (vars. Rastatt and Umkircher) was subjected to 78–80°C for 20 hr a proportion of the seeds suffered some necrosis in the aleurone layer. This was followed by fungal infection and reduced germination, as revealed by the germination test in sand. Seed disinfection with ceresan reduced this loss.—D.B.

640 Santos, I. S. **Effect of seed treatment with maleic hydrazide on germination and seedling growth of corn.** *Philipp. Agriculturist* 1960, **44**, Nos. 2–3, 134–45, bibl. 10. [Central Exp. Sta., Univ. Philippines, College, Laguna]

Seed treatment with MH, including soaking in MH solution or storage with MH in powder form, resulted in a delay of at most one day in emergence of maize seedlings. There was an indication that seeds stored with MH lost their viability faster than the untreated seeds. Seedlings grown from seeds soaked in MH solution grew very slowly and died sooner or later. Seedlings grown from seeds stored with MH for 12 or more days also died. There is still hope that seedlings from seeds stored with MH for 8 days or less may live to reach maturity. F. s.—R.B.

641 Sjui Fyn' and Kulešov, N. N. [**A method for investigation of the root system of maize under field conditions.**] [Russian] *Fiziol. Rast.* (*Pl. Physiol. USSR*) 1959, **6**, No. 5, 611–14. [Kar'kov Agric. Inst.]

The method is based on a process which includes separating the plants from the mesocotyl and seminal roots and from the prop roots.—M.H.

642 Fayemi, A. A. and Laude, H. H. **A method of studying corn root characteristics.** *W. Afr. J. biol. Chem.* 1959, **3**, No. 1, 15–18, bibl. 3, illus. [Kansas Agric. Exp. Sta., Manhattan] [Seen Jan., 1961]

A glass-chamber method was evaluated for studying root characteristics of 10 maize hybrids in the laboratory. Experimental results indicated that the method could furnish reliable information on root characteristics of young maize plants. F. s. —E.B.O.

643 Woodstock, L. W. and Skoog, F. **Relationships between growth rates and nucleic acid contents in the roots of inbred lines of corn [maize].** *Amer. J. Bot.* 1960, **47**, No. 9, 713–16, bibl. 8. [Univ. Wisconsin, Madison]

644 Klimaševskiĭ, E. L. **The effect of the pH of the nutrient solution on the growth and certain physiological and biochemical processes in *Zea mays*.** [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1960, **134**, No. 4, 969–71, bibl. 9, illus. [Uralsk Sci. Res. Inst. Agric.]

The wide distribution of podzol soils on which maize is now grown has raised the problem of the adaptation of maize to an acid medium. From culture experiments made during 1957–9, the author obtained evidence that soil acidity had a depressing influence on maize as early as seedling emergence, which was lowered from 92% in the case of the sowings at pH 7 to 66% at pH 4. This depressing influence was reflected in respiration of the germinating seed. For example, 100 g of seed in a nutrient solution at pH 4 gave off 6·27 ± 0·12 mg CO_2/hr, while at pH 6·5 the amount was 14·9 ± 0·24 mg. This increase in respiration produced more active metabolism in the tissues ; the absolute dry weight of 25 maize plants grown in media ranging from pH 4 to pH 7 was between 3·8 g and 21·4 g. The data also showed that the root system in maize was more sensitive to the pH of the nutrient medium than were the aerial organs. The lowering influence of an acid medium was augmented with lowered temperature during seedling growth ; for example, the dry weight of 100 seedlings grown during 10 days in a medium with pH 6·5 at 18 – 19°C was 4 g, but at 8·9°C, it was 2·8 g. Thus, maize is in an unfavourable environment if it is grown in acid soil at low temperature. —M.H.

645 Smith, R. C. **Influence of upward water translocation on uptake of [phosphate] ions in corn [maize] plants.** *Amer. J. Bot.* 1960, **47**, No. 9, 724–9, bibl. 14, illus. [Rutgers Univ., New Brunswick, New Jersey]

646 Peters, D. B. **Growth and water absorption by corn as influenced by soil moisture tension, moisture content, and relative humidity.** *Proc. Soil Sci. Soc. Amer.* 1960,

24, No. 6, 523–6, bibl. 5. [Soil and Water Conserv. Res. Div. USDA, Urbana, Illinois]

Maize plants were grown in silty clay loam, or a mixture of 33% loam and 67% sand, at 0·3, 1, 3 or 10 atm soil-moisture tension under controlled environmental conditions (78°F, 40 or 95% R.H.). At low humidity, growth was profoundly influenced by both soil-moisture tension and soil-moisture content, while at high humidity these factors influenced growth to only a small extent.—R.B.

647 Ščerbakov, B. I. [**Productivity of maize during the process of raising its drought resistance.**] [Russian] *Izv. Akad. Nauk Kazah SSR* (*Bull. Acad. Sci. Kazah SSR*) 1960, No. 3(9), 62–73, bibl. 40.

It is recognized that during years in which the weather is unfavourable for crop growth, harvests are adversely affected, especially when precipitation is deficient. This problem has been studied widely in experimental conditions, mostly without considering the phase of development of the crop when the unfavourable conditions prevail. The author's work is concerned with changes in the quantity of the harvests [green and grain] from different generations of maize grown in dry soils (takyr/grey earth [takyr = undrained desert basin]) and with the effect of drought on plant morphogenesis. The variety Alma-Atinskaja 236 was grown under field conditions (with NPK at 60, 120 and 30 [kg] per ha and irrigation at 800 cu. m on plots of 70 × 70 cm). The watering was withheld during one of the following times: (1) the period of growing-point differentiation ; (2) formation of reproductive organs ; (3) flowering ; (4) milk ripeness ; and (5) wax ripeness. The experiment was made in the desert zone of the Balhaš shore [45°N., 75°E.]. It is shown that both long and short periods of drought at any developmental period in this variety result in an interruption of morphogenesis and in an increase of grain production from the subsequent generations when grown repeatedly under a deficient water supply. The period in maize ontogeny when the crop is most adaptable for adjusting its resistance to drought is at the beginning of structure-forming processes, i.e. during the initiation of internodes, leaves and reproductive organs.—M.H.

648 Kurbatov, I. M. and Dovnar, V. S. [**Utilization of solar energy by maize in dense sowings.**] [Russian] *Doklady Akad. Nauk Belor. SSR* (*Proc. Acad. Sci. White Russia*) 1960, **4,** No. 10, 435–7, bibl. 4. [White Russ. Agric. Acad., Gorky]

This study was made with the maize hybrid VIR-25, using an elaborated process of the half-leaf method [Sachs, 1884]. The experiment was initiated during sunny days in Aug. 1959, [56°N., 44°E.] when the crop was at a height of 230 cm and the stand density was 66·5 thousand plants per ha. The intensity of photosynthesis in the leaves at different levels was (during 7.30 am–2 pm) 6·87 g/sq.m for the uppermost layer, 4·37 g for the middle layer and 1 g for the lowest. Light intensity at these levels was (in 1000 lux at noon) 172, 48 and 10, respectively. The data require correction to allow for translocation of the assimilates ; this translocation in maize occurs chiefly during the daytime and is restricted at night because of lowered temperature. The daily accumulation of assimilates in the leaves at the above 3 levels was (g/sq.m, between 7.30 am and 6 pm) 11·20, 6·56 and 1·92, respectively. To determine the extent of utilization of solar energy by the whole maize crop the data were calculated per ha. The figures were as follows : leaf area 46,640 sq.m for the 3 levels ; daily photosynthetic production 315 kg/ha (total for the 3 levels) ; utilization of solar energy 3·1% (calculated according to the method of Krašeninnikov, 1901, for determining calorific values of assimilates) when the daily insolation from an unclouded sky in mid-Aug. was $46 \cdot 10^6$ kg/cal/ha.—M.H.

649 Tanner, C. B. and others. **Radiant energy exchange in a corn field.** *Agron. J.* 1960, **52,** No. 7, 373–9, bibl. 8, illus. [Wisconsin Agric. Exp. Sta., Madison]

Measurements of net radiant energy available for evaporation from soil under maize drilled in 40-in. rows and of total energy available for evapotranspiration indicated that evaporation may account for, at a maximum, about 30% of the total evapotranspiration from fully grown (silking complete) maize sown at 13 thousand plants/ac where moisture was adequate (1957), and 40% where moisture was deficient (1958). With 22 thousand plants/ac, maximum evaporation was 25 to 35% of evapotranspiration. There was little net difference between maize in rows running N to S and in rows running E to W. Maize spaced 40 in. × 40 in. had a more open stand than drilled maize, and maximum evaporation was 35 to 50% of evapotranspiration. About 80% of the energy available for evaporation at the soil surface was derived from solar radiation penetrating the maize foliage, and 20% from heat radiation from the maize. The proportion of total net radiation exchanged at the soil surface was considerably greater than the proportion of solar energy transmitted to the soil through the maize foliage. This throws considerable doubt on estimates of degree of cover (relative radiant energy exchange at the vegetation and soil) obtained from visual judgement of the amount of shading under the vegetation. F. s.—R.B.

650 Sowell, W. F. **Factors contributing to the superior yielding ability of compact semidwarf maize at high population.**

Diss. Abstr. 1960, **20**, No. 7, 2476. [Purdue Univ., Lafayette, Indiana]

Two inbred maize varieties, one normal and one of compact type, with roughly comparable genotypes except for the loci affecting plant size, were compared under laboratory and field conditions. GA increased the elongation of compact seedlings in a glasshouse and under controlled environmental conditions, but not in the field. Plants were grown in the field, with adequate moisture and high fertilizer rates, at 52,000 plants/ac. Prior to flowering, dry-weight accumulation was the same in both varieties. During flowering, the vegetative growth rate of normal plants was greater than at any other stage of development, whereas compact plants ceased vegetative growth at this stage. Whereas 62% of normal plants failed to produce grain, only 5% of compact plants were barren. Normal plants at high populations appeared not to be able to support rapid vegetative growth and ear-shoot development at the same time. It was shown that tassels of compact plants produced less growth-promoting substances, or more growth inhibitors, than those of normal plants. These substances were considered to prevent vegetative growth of compact plants at flowering and to enable them to produce higher grain yields than normal plants when grown at high plant populations.—R.B.

651 Sawada, Y. **Physiological and morphological studies on the pollen grain. Part 18. Nitrogen metabolism of the pollen grain in *Zea mays* L.** [Japanese] *Bot. Mag. Tokyo* 1960, **73**, No. 864, 252–7, bibl. 10, English summary. [Hokkaido Gakugei Univ., Japan]

Transaminase was present in the pollen grains of *Z. mays* ; it activated reactions between glutamic and aspartic acids and between glutamic acid and alanine. The amino acid content in the male and female flowers increased gradually as the flower buds matured, attained a maximum immediately after anther dehiscence, then decreased. F. Eng. s. —D.B.

652 Walger, J. and Szabo Szücs, J. A kukorica érésfolyamatának vizsgálata egy csövön belül. [**Methods for determining the advancement of seed maturation in maize.**] *Agrokémia és Talaj.* 1960, **9**, No. 3, 323–30, bibl. 7, illus., Russian and English summaries. [Dept. Forage Crops, Inst. Agric. Quality Testing, Budapest]

Changes in the dry-matter content of maturing seeds of the same ear of maize were followed by excising weekly one of the parallel rows of seeds. After excision of a row, the covering leaves of the ear were placed back in their original position, fastened with rubber rings, and protected by an additional cover of parchment paper. The place occuped by the excised row was taken over by the adjacent rows almost completely in 2 weeks, and no injuries were observed on the seeds in these rows. The dry-matter content of maturing maize seeds rapidly increased in the first phase of their development ; later, the process slowed down, but stopped only at full maturity. By determining the dry-matter content of the maturing seeds, the exact phase of development of an ear, of a plant, or even of a plot can be conveniently and exactly expressed. F. Eng. s.—G.M.R.

653 Davies, J. C. **Experiments on the crib storage of maize in Uganda.** *E. Afr. agric. for. J.* 1960, **26**, No. 1, 71–5, bibl. 3. [Dep. Agric., Uganda]

Trials on the crib storage of maize in Uganda are described. Eight oz of 0·5% γ BHC per 9 cu. ft of cobs gave good and economic control of *Calandra oryzae*, *Brachypeplus*, *Cryptolestes minutus*, *Ahasverus advena* and *Carpophilus dimidiatus* for over 15 months.—S.M.J.

SWEET-CORN

654 Jepson, W. F. and Mathias, P. **The control of frit fly, *Oscinella frit* (L.), in sweet corn (*Zea mays*) by thimet (O, O-diethyl S-ethylthiomethyl phosphorodithioate).** *Bull. ent. Res.* 1960, **51**, No. 3, 427–33, bibl. 16, illus. [Silwood Park, Sunninghill, Berks]

Sweet-corn is frequently attacked by frit fly in S. England because the optimal sowing date (1–20 May) determines the appearance of the seedlings at the peak of the spring flight (13–30 May). Results from a trial including 3 thimet treatments showed that almost complete control could be obtained by treatment with 8% granular thimet at 2 lb active ingredient per ac in 3 : 1 dilution with dry silver sand, applied (a) in the seed furrows at sowing, or (b) along the rows on newly emerged plants. The crop on the untreated control plots was more than halved by the naturally occurring infestation on 45% of the primary shoots. Estimation of thimet residues in cobs from treatment (a) showed only a trace of toxic material. No detectable taint was found on cobs from treated plots.—E.B.O.

SORGHUMS AND OTHER MILLETS

See also Abs. 634, 857.

655 Divakaran, K. and Sivagnanam, L. **Age of seedlings experiment in Ragi.** *Madras agric. J.* 1960, **47**, No. 5, 212–14.

The optimum seedling ages for transplanting varieties of *Eleusine coracana* are : short duration (Co. 7) and medium duration (Co. 2), from 20th to 35th day ; long duration (Co. 1) from 25th to 35th day. When beyond this optimum age the [inter] nodes of the seedlings elongate, and after transplanting, their growth and yields are poor.—D.B.

656† Scott, W. O'D. **Some effects of competition between alfalfa and sorghum or corn for light, moisture and nutrients.** *Diss. Abstr.* 1960, **20**, No. 7, 2473–4. [Purdue Univ., Lafayette, Indiana]

Lucerne grown alone or in combination with grain sorghum or maize, and both cereals grown alone were subjected to 4 different periods of simulated drought. There was no significant evidence of serious competition between crops for moisture. Grain sorghum, forage (tall) sorghum and maize in 20-, 40-, or 60-in. rows were intercropped with lucerne. Grain sorghum competed more strongly with lucerne, especially in 20-in. rows, than did the taller forage sorghum. The light intensity between rows of grain sorghum at the 20- and 40-in. spacing was only 25–50% as great as that between similarly spaced maize rows. Competition for light was considered to be the major cause of differences in lucerne establishment. Sorghum yields were materially reduced by the presence of lucerne only where the lucerne was sown earlier than the sorghum. Sorghum yields were greatest at the 20-in. row spacing.—R.B.

657† Ram, A. **Effect of nitrogen fertilization on yield and nitrogen content of forage sorghum varieties.** *Diss. Abstr.* 1960, **20**, No. 10, 3917–18. [Cornell Univ., Ithaca, New York State]

In glasshouse trials, the forage sorghum varieties Black Amber and Leoti were grown with 0, 75, 150 or 225 lb N/ac applied either at sowing, 35 days after sowing, or in 2 equal applications on both dates. Increasing rates of N progressively hastened heading. Plants receiving no N at sowing tillered profusely when N was applied 35 days after sowing. The tallest plants were produced when the highest rate of N was applied at sowing and when the 2 highest rates of N were given as split applications. Highest yields of dry matter were obtained with the highest rate of N applied either at sowing or as split applications. High rates of N applied late or as split applications produced forage containing a high percentage of N.—R.B.

658 Institut National pour l'Étude Agronomique du Congo Belge. [**Sorghum.**] *Rep. INÉAC 1959* 1960, 384 and 491.

At the Experimental Station of Keyberg the fodder sorghum varieties Lali, Koko and 021 yielded best with 67,800, 64,200 and 58,700 kg green matter/ha, respectively, from one cut. Trials at Rubona Station showed the superiority of the grain sorghum varieties S.V.R. 44, S.V.R. 56 and S.V.R. 28 (which yielded 3699 kg, 3670 kg and 3647 kg dry grain/ha, respectively) and confirmed the advantage of sowing early (1–15 Jan.).—E.B.O.

659 Last, F. T. **Incidence of *Striga hermonthica* (Del.) Benth. on two varieties of irrigated sorghum differently manured, spaced and thinned.** *Trop. Agric., Trin.* 1960, **37**, No. 4, 309–19, bibl. 19. [Gezira Res. Sta., Wad Medani, Sudan]

During an investigation of the effects of different cultural treatments on yields of *Sorghum vulgare*, samples of *Striga hermonthica* growing on the sorghum varieties Dwarf Hegari and Feterita 1931 were taken 50, 64, 80 and 125 days after sowing the sorghum. The maximum yield of *S. hermonthica* (5·4 lb/ac/day) occurred 65–80 days after sowing the sorghum. The application of 80 lb N/ac as ammonium sulphate greatly increased yields of sorghum grain and straw but decreased the total aerial growth of *S. hermonthica* from a mean of 245 lb/ac in unmanured crops of both varieties to 98 lb/ac. Increasing the spacing from 25 to 100 cm and reducing the number of plants per hole from 8 to 2 did not affect the grain yield per acre but quadrupled the yield per plant of both varieties. Straw yields increased progressively with increasing plant density. In the first 7 weeks after sowing, yields of *S. hermonthica* per host plant were highest on the closer spaced plants i.e. 25 cm apart ; later, yields per host were greater at wider spacings, e.g. 50 and 100 cm, and they were greater on Feterita than on Dwarf Hegari.—S.M.J.

660 Clinton, P. K. S. **Some pests and diseases of sorghum and their control in the central rainlands of the Sudan.** *Emp. J. exp. Agric.* 1960, **28**, No. 112, 294–304, bibl. 6. [Centr. Rainlands Res. Sta., Sudan]

The fungal diseases and some of the pests of sorghum at Tozi are recorded for the period 1952–6. *Sphacelotheca sorghi* was controlled by seed dressings with organic mercurial compounds or TMTD. Lodging as a result of *Sclerotium bataticola* was reduced slightly by the application of TMTD (a) as a seed dressing (1 : 900 parts by weight), (b) to the soil before or shortly after sowing, at 1 rotl a.i./feddan [1 rotl = 0·98 lb, 1 feddan = 1·038 ac]. Neither DDT, aldrin nor dieldrin controlled *Atherigona*, but resistant varieties of sorghum are being developed.—S.M.J.

661 Passlow, T. **Insecticidal control of sorghum midge, *Contarinia sorghicola* (Coq.)** *Qd J. agric. Sci.* 1960, **17**, No. 2, 83–9, bibl. 5. [Div. Pl. Indust., Qd Dep. Agric.]

During 1951–6, eight field trials were carried out on the Darling Downs and in the Callide Valley, on the control of *Contarinia sorghicola* on sorghum. When insect population was high, i.e. > 6 females/head at flowering, the application of DDT at 1 lb/ac gave good and economic control. F. S.—S.M.J.

RICE

662 Spoon, W. De verbouw van rijst in Portugal **Cultivation of rice in Portugal.** *Tijdschr.*

econ. soc. Geogr. 1960, **51**, No. 3, 70–2, bibl. 4, illus., maps 1, English summary.

Rice is grown under irrigation in Portugal in the valleys of the Vouga, Mondego, Tejo and Sado rivers, where the average yields are 0·7, 3·2, 4·9 and 4·9 tons/ha, respectively. Among the varieties used, Chinês is the most widely grown. In the 2 northern valleys, Allorio and Muga are preferred to the late-ripening Chinês. Ponta Rubra is a useful variety in the Tejo and Sado valleys since it can thrive on somewhat saline land. Most of the fields are small and are cultivated and harvested by hand. —R.B.

663 Walter, C. Risicoltura in Israele. [**Rice-growing in Israel.**] *Riso* 1960, **9**, No. 7, 16–17.

664 Ghose, R. L. M. and Sayegh, Y. El. **Rice in the Sudan.** *Internat. Rice Comm. News Lett.* 1960, **9**, No. 3, 13–16, bibl. 1. [Wau, Sudan]

665 Eynard, I. La coltura del riso in Iran. [**Rice-growing in Iran.**] *Riso* 1960, **9**, No. 12, 6–9, bibl. 7, illus. [Fac. Sci. Agr., Univ. Torino, Italy]

666 Vollema, J. S. **Rice-growing successfully established at Merauke.** *S. Pacif. Bull.* 1960, **10**, No. 4, 56–60.

This article describes the work and results obtained in 1958–9 from mechanized rice-growing in the pilot polder Koembe near Merauke, Netherlands New Guinea. [For results in the 2 previous years see *Fld Crop Abstr.* 12 : 117.] It was demonstrated that the young marine clays of the southern coast are eminently suitable for rice. As a result, it is intended to establish a main project of mechanized rice-growing on about 12,000 ac near Merauke. Successful rice-growing in this region is dependent on irrigation with which soil condition should improve rapidly and high yields should be obtained within a few years.—E.B.O.

667 Miyake, M. and Hoshi, S. **Comparison of rice culture systems in Hokkaido.** [Japanese] *Res. Bull. Hokkaido nat. agric. Exp. Sta.* 1960, No. 75, 53–9, bibl. 10, English summary.

The physiology of nutrition of rice was studied under 3 systems of cultivation. These were (with their date of introduction into Hokkaido) : water-bed nursery (about 1700), direct sowing (early part of this century), land-bed nursery (1940s). Under all 3 systems flower primordia were laid down and flowering began on the same date, and plants showed the same fluctuations in mineral and carbohydrate content after the elongation stage. By the first method, tillering was delayed. The second method resulted in short, narrow leaves and small ears. The third method resulted in the longest tillering period, good vegetative growth, a slightly higher yield and a grain/straw ratio which was lower than that obtained by the water-bed nursery. The land-bed nursery system is now practised throughout Hokkaido. F. Eng. s.—D.B.

668 Chang, H. and Lin, R. C. **Studies on the spring paddy sugar-cane in Taiwan.** [Chinese] *J. agric. Assoc. China* 1960, No. 29, 44–52, bibl. 4, English summary.

This paper is written from the standpoint of sugar-cane cultivation. Interplanting sugar-cane in rice fields in spring had no significant effect on the yield of rice. F. Eng.s.—D.B.

669 Langfield, E. C. B. and Basinski, J. J. **The effect of time of planting on behaviour of rice varieties in Northern Australia.** *Trop. Agric., Trin.* 1960, **37**, No. 4, 283–92, bibl. 5. [Div. Land Res. and Reg. Surv., CSIRO, Canberra, Australia]

A preliminary field trial, which included 17 rice varieties sown at fortnightly intervals throughout 1 year, was carried out at the Kimberley Research Station in the northernmost part of Western Australia. The results of this trial confirmed the existence of wide intervarietal differences in the effect of time of sowing on height of plants, tiller numbers, time to earing and percentage of sterile spikelets. The vegetative development in *indica* varieties was in general more affected by time of sowing than in other varieties. A number of *indica* varieties has also shown strong photoperiodic sensitivity by a tendency to ear in April when sown between late July and end of Jan. When sown at other times of the year earing tended to be uneven. In 2 instances the unevenness was extreme and was associated with very high sterility. A majority of the varieties sown early in the dry season, and earing during or soon after the coolest part of the year, showed very high spikelet sterility. With the *japonica* variety Caloro, a similar high proportion of sterile spikelets was found in crops sown early in the wet season and maturing towards the end of it. Possible causes of the effects of date of sowing on the behaviour of rice are discussed. Taking into account the local climate it is recommended that *japonica* varieties should be sown in late May and June. F. s.—S.M.J.

670 Piacco, R. Risicoltura senza irrigazione. [**Rice-growing without irrigation.**] *Genio rur.* 1960, **23**, No. 11, 1061–70, bibl. 15, illus. [Sta. Sper. Risicolt., Vercelli, Italy]

The systems used in various countries of the world for growing rice without irrigation (with rain and/or flood water from rivers) are reviewed.—E.B.O.

671 Guillaume, M. Les aménagements hydro-agricoles de riziculture et de culture de

décrue dans la vallée du Niger. [**The hydrological-agricultural management of rice-growing, and of crops grown after floods, in the Niger Valley (Republic of the Sudan).**] *Agron. trop., Paris* 1960, **15**, No. 4, 390–413, English and Spanish summaries.

[See also *Fld Crop Abstr.* 14 : 151.]

672 Hall, V. L. **Greenhouse studies on the relation of water management to the growth of rice.** *Rep. Ser. 89 Arkansas agric. Exp. Sta.* 1959, pp. 22, bibl. 14.

The experiments were conducted on a silt loam soil in 2-gal glazed jars using variety Bluebonnet 50 and tap water. Draining and reflooding this soil was found to be valueless in itself, but useful as a procedure for applying fertilizer. N applied at the equivalent of 100 lb/ac had most effect on yield when draining, fertilizing and reflooding were delayed until about 92 days after sowing. The benefit to yield accrued in the form of more florets set, and not as heavier seed. Loss of yield, expressed as reduction in numbers of florets set, is given for treatments where there was no reflooding, no fertilizer, or no flooding at all. The alternative procedure of applying fertilizer before the initial flood, with no subsequent draining and reflooding, was also best when delayed, in this case until about 62 days after sowing.—J.D.J.

673 Čirkova, R. A. [**The regime of nutrients in the soils of rice fields in the Kzyl-Ordinsk Province.**] [Russian] *Izv. Akad. Nauk Kazah. SSR* (*Bull. Acad. Sci. Kazah SSR*) 1960, No. 3(9), 42–53, bibl. 16.

Rice is the most promising grain crop for this Province [45°N., 65°E.], but yields are low because of the lack of scientific production methods. During 1954–8 studies were made of the soils under *Phragmites communis* (virgin land), *Oryza sativa* and lucerne. Observations were recorded on phenological aspects, accumulation of roots and green matter, and plant nutrients. It is concluded that 2 or 3 years continuous growing of rice deplete the organic substances and the available form of N and P in the soil ; the best method of replenishment is a rotation with lucerne. Flooding does not affect the soil's K content, which element is not a factor limiting rice yields.—M.H.

674 Misro, B. **Certain considerations on blue-green algae arising from the Symposium on Algology held at New Delhi during December, 1959.** *Rice News Tell.* 1960, **8**, No. 1, 9–11, bibl. 10. [Centr. Rice Res. Inst., Cuttack, India]

This is a short review of recent literature on the role of blue-green algae in improving soil fertility of rice fields. In field experiments, 3–22% increases in rice yield were reported as a result of soil inoculation with *Tolypothrix tenuis*. Blue-green algae thrive in an alkaline medium (pH 7·5), and their growth is accelerated by phosphates and lime, but not by applied nitrogen fertilizers. Blue-green algae exercise the double role of fixing atmospheric nitrogen and liberating oxygen as a product of their photosynthesis. Studies with an endophytic strain of *Nostoc* found in root nodules of *Trifolium alexandrinum* showed that molybdenum increased the ability of the alga to fix atmospheric nitrogen. It has been suggested that a regular crop rotation of rice and *T. alexandrinum* would inoculate the soil with *Nostoc* at no cost.—D.B.

675 Yamada, N. **The nature of fertilizer response in japonica and indica rice varieties.** *Trop. Agriculturist* 1959, **115**, No. 3, 163–72. [Dep. Agric. Ceylon]

See *Fld Crop Abstr.* 13 : 1715.

676 Abichandani, C. T. **A simple and rapid tissue test for determination of nitrogen requirement of rice crop.** *Rice News Tell.* 1960, **8**, No. 1, 12–14, illus. [Centr. Rice Res. Inst., Cuttack, India]

The concentration of N reserves such as amino acids, polypeptides and simple proteins in plant sap was used to determine the N requirement of a rice crop. Circular chromatograms were made as follows. Sap from the base (lowest 1–3 cm) of the stem of the main tiller, 20–30 days after planting, was expressed on to circular filter paper, dissolved in a solvent consisting of butanol, glacial acetic acid and a 1% aqueous solution of ninhydrin, and heated for a few minutes at 60–70°C. The intensity and thickness of the bluish-violet ring which developed was a measure of the N required by the soil for that crop. The ring is judged against prepared standards which have been made to correspond with graded N levels. Experimental details are given.—D.B.

677 Yamada, N. and Kirinde, S. T. W. **Effect of level and time of application of ammonium sulphate on broadcast paddy.** *Trop. Agriculturist* 1959, **115**, No. 4, 225–40, bibl. 4. [Dry Zone Res. Sta., Maha Illuppallama, Ceylon]

The application to rice of 60 lb N/ac in a single dose 3 weeks after sowing gave the highest yield, which was 33% more than the yield of the untreated control. F.S.—E.B.O.

678 Thaung, M. M. **Relative absorption of phosphorus by rice plants from native and additive sources, using radioactive phosphorus as a tracer.** *Soil Sci.* 1960, **90**, No. 5, 284–9, bibl. 9. [Appl. Res. Inst. Farm, Gyogon, Rangoon, Burma]

In the trial described, 30-day-old plants of the Burmese rice variety C28–16, were transplanted from a nursery in a 2-foot wide plot of clay-loam soil and dressed with ammonium dihydrogen orthoradiophosphate 9, 54 or 80 days after transplanting. The best yield, found to result from manuring 9 days after transplanting, was apparently due to an early and efficient plant utilization of both P and N, by which growth and reproduction were improved.—E.B.O.

679 Izawa, G. and Kume, I. **Influence of silica on the growth of rice plant in relation to the nitrogen levels.** [Japanese] *Sci. Reps Hyogo Univ. Agric. (Agric. Chem.)* 1959, **4**, No. 1, 13–17, bibl. 7, English summary.

From field and glasshouse experiments with rice it was shown that a high level of nitrogen resulted in a low silica content throughout the plant and in lower resistance to rice-blast disease and to lodging. Slag from iron-smelting works was used to provide a silica-containing fertilizer. Applied at 112·5–375 kg per decare this fertilizer improved growth and silica content of rice plants and resulted in yields 5–11% above yields of control plants. F. Eng. s.—D.B.

680 Smith, R. J., Jr and others. **Pre-harvest desiccation of rice with chemicals.** *Bull. 619 Arkansas agric. Exp. Sta.* 1959, pp. 16, bibl. 8.

Desiccants were applied by aeroplane to non-replicated rice plots during 5 seasons. $NaClO_3$ (18·5%) at 2 gal/ac and $Mg(ClO_3)_2$ (40%) at 0·9 gal/ac accelerated the drying of grain containing 21 to 31% moisture by about 1% per day, depending on the weather, so that rice could be combine-harvested about 6 days after treatment. These chemicals are best applied when average grain moisture is between 24 and 26%. Endothal and MCA (Na salt) accelerated drying, but were unacceptable because they reduced quality and affected milling performance. DEF (S,S,S-tributyl phosphorotrithioate) did not assist drying. The effective desiccants also dried the leaves, but stems were not greatly affected. Combine losses and germination of seed were not affected by desiccants, but bushel weight was reduced by endothal. Desiccants helped the combining of lodged crops of the varieties Rexark, Zenith and Bluebonnet, but not of Arkrose, which has a wiry stem.—J.D.J.

681 Evatt, N. S. and Beachell, H. M. **Ratoon cropping of short-season rice varieties in Texas.** *Internat. Rice Comm. News Lett.* 1960, **9**, No. 3, 1–4, bibl. 4. [Texas Agric. Exp. Sta., Beaumont]

In Texas the practice of ratoon cropping, which appears to be a practical means of increasing rice yields, is gradually being extended by using early-maturing varieties (109–132 days from sowing to maturity). Yields of 1500–2000 lb of paddy/ac have been reported from some ratoon crops. Under favourable growing conditions the new, very early rice varieties (100–105 days) gave yields comparable with those of later varieties. The use of these very early varieties will eliminate much of the risk involved in ratoon cropping by reducing the necessity for early sowing.—E.B.O.

682 Singh, S. G. and Singh, S. J. **Basmati-217. A new fine variety of rice in the Punjab.** *Rice News Tell.* 1960, **8**, No. 1, 19–20, illus. [Dep. Agric., Punjab, India]

Basmati 217 flowers a week earlier than Basmati 370 and ripens in 115–120 days. It grows tall, has a stiff straw and resists lodging. It requires fertile land with a plentiful supply of irrigation water. Its yield (5-yr av. 1618 lb/ac) is significantly higher than from Basmati 370 (1370 lb/ac). Cooking qualities of both varieties are approximately the same, but Basmati 217 takes longer to cook.—D.B.

683 Singh, G. and others. **T23 — a fine quality rice for Punjab hills.** *Indian Fmg* 1960, **10**, No. 3, 19, illus. [Dep. Agric., Punjab]

Desi Basmati type 23 is a new variety of fine-quality rice, and because it ripens early, is suitable for the Punjab Hills. Average plant height is 53 in. The grains are 6·7 × 1·8 × 1·6 mm and 100 weigh 2·66 g. Grain yields are 165 lb/acre more than from the local variety. T23 closely approaches Basmati 370 (the superfine variety of the plains) in cooking quality.—D.B.

684 Pawar, M. S. and others. **A short note on the trial of some introduced paddy varieties at Himayatsagar, Andhra Pradesh [India].** *Internat. Rice Comm. News Lett.* 1960, **9**, No. 2, 25–8.

The introduction of new methods of rice-growing in Andhra Pradesh, including the use of high rates of fertilizers, makes it necessary to find new high-yielding varieties. Many of the improved varieties introduced from other parts of India and 19 other countries when tested at Himayatsagar were found to be unsuitable ; but some Indonesian varieties, such as Kentjana, Salak, Bengawan, Tjina and No. 2904 were promising and could be recommended.—E.B.O.

685 Yamada, N. **Analysis of the yield potential of the indica hybrid, H-4.** *Trop. Agriculturist* 1959, **115**, No. 3, 173–8, bibl. 3. [Dep. Agric., Ceylon]

686 Department of Agricultural Research, Nigeria. **Inter-varietal trials with**

rice. *Rep. Dep. agric. Res., Nigeria 1958-9* 1960, 16.

In varietal trials on naturally inundated lowlands at Badeggi with 8 floating varieties of *Oryza sativa*, the varieties Tisei, Nan Rung F 6, Mbagboli and Mali Ong were not significantly lower yielding than the present standard floating variety Indo-China 53 (17·4 cwt/ac). In a similar trial in 1957 Mbagboli significantly outyielded Indo-China 53. Under deep-flooding conditions (>5·5 ft) at Birnin Kebbi, Indo-China 53 (14·3 cwt/ac) and Mbagboli (12·6 cwt/ac) outyielded the local deep-water variety, Babban Fari (9·7 cwt/ac).—S.M.J.

687 Institut National pour l'Étude Agronomique du Congo Belge. [**Rice.**] *Rep. INÉAC 1959* 1960, 84, 176, 364, 371 and 404.

The rice variety R 66 is being multiplied for distribution to farmers. In 1958 a quarter of the rice produced and traded in the Belgian Congo was of this variety. At Lubarika Station the variety L 7 was multiplied and yielded 3124 kg paddy/ha; the best time for transplanting this variety was 35 days after sowing. At Simama Station the varieties L 7 and L 9, introduced from Lubarika, yielded 2860–3872 kg and 3198–3535 kg dry paddy/ha, respectively. At Yangambi, studies are in progress on the resistance of rice varieties to drought and on the evapotranspiration of rice.—E.B.O.

688 Julen, G. and Kjaer, A. **Seed certification schemes for rice in various countries.** *Internat. Rice Comm. News Lett.* 1960, **9**, No. 2, 1–16, bibl. 12. [Crop Prod. Improv. Br. FAO, Rome]

689 Ciferri, R. Fitosociologia delle malerbe delle risaie italiane e iberiche. [**Phytosociology of weeds in Italian and Iberian rice-fields.**] *Riso* 1960, **9**, No. 7, 10–11.

690 Paul, A. K. and Bhattacharyya, R. K. **Paddy field weed flora of the State Agricultural Farm, Chinsurah (West Bengal).** *J. Indian bot. Soc.* 1959, **38**, No. 2, 249–53, bibl. 10. [Dep. Agric. W. Bengal] [Seen Jan., 1961]

The Cyperaceae and Gramineae are predominant among the 57 weed species recorded. F. S.—E.B.O.

691 Smith, R. J., Jr. **3,4-dichloropropionanilide : a promising new herbicide for control of barnyard grass in rice** [Abstract]. *Proc. S. Weed Conf.* [*USA*] 1960, **13**, 245–7, bibl. 2. [Agric. Res. Serv. USDA, Stuttgart, Arkansas]

The effect of 3,4-dichloropropionanilide on rice was not influenced greatly by variety of rice, or method and depth of sowing. In glasshouse and field investigations, best control of barnyard grass (*Echinochloa crus-galli*) was obtained by applying at least 4 lb 3,4-dichloropropionanilide/ac when the grass was at the 1- to 3-leaf stage. Rice at the 3- to 4-leaf stages of growth was injured by the herbicide at rates of 8 lb/ac and above, but at the 1- to 2-leaf stages 32 lb/ac was needed to cause severe injury. Results indicated that method and depth of sowing, time of treatment and water management after treatment may be less critical with 3,4-dichloropropionanilide than with chlorpropham.—A.M.H.

692 Baker, J. B. **Preliminary report on the pre-emergence use of O-2,4-dichlorophenyl-O-methyl isopropylphosphoramidothioate [zytron] to control barnyardgrass in rice** [Abstract]. *Proc. S. Weed Conf.* [*USA*] 1960, **13**, 242. [Louisiana State Univ., Baton Rouge, USA]

Tests during 1959 indicated that zytron is a promising pre-emergence herbicide for controlling barnyard grass [*Echinochloa crus-galli*] in drilled rice. Application of 3–9 lb zytron/ac increased rice yields by 40–50%. In a silt loam soil 6 lb zytron/ac caused no injury to Bluebonnet 50, Magnolia or Nato when sown at depths of 0·5, 1·0 and 1·5 in. Nato sown 1 in. deep showed no injury from treatment with 5, 10, 20 or 40 lb zytron/ac. In a river sand, the 6 lb/ac treatment caused slight injury to Nato sown 1 in. deep and severe injury to Nato sown 0·25 in. deep. In petri-dish tests rice tolerated 10 times as much zytron as did barnyard grass.—A.M.H.

693 Smith, R. J., Jr. **Chemical control of barnyardgrass [*Echinochloa crus-galli*] in rice.** *Weeds* 1960, **8**, No. 2, 256–67, bibl. 6, illus. [Rice Br. Exp. Sta., Stuttgart, Arkansas]

See *Fld Crop Abstr.* 12 : 1771.

694 Goarin, P. Note sur le lessivage des herbicides par des pluies tropicales. [**Note on herbicide leaching caused by tropical rain.**] *Agron. trop., Paris* 1960, **15**, No. 4, 450–4, English and Spanish summaries. [Sta. Agron. Alaotra, Madagascar]

The results are given of a trial in which treatment with 8 herbicides applied to rice infested by weeds (mainly *Pycreus tremulus*, *Courtoisia cyperoides* and *Cyperus difformis*) was followed by 30, 60 or 90 mm of artificial rain (applied by sprinkling), 6, 8 or 10 hr later. Yields were always lowered by rain and resulting leaching of the herbicides but this effect varied with the amount of rain, the number of hours between treatment and rainfall, and the herbicide used.—E.B.O.

695 Rolston, L. H. and Rouse, P. **Control of grape colaspis and rice water weevil by seed or soil treatment.** *Rice J.* 1960, **63**, No. 10, 8, 22, 27 and 30–1, bibl. 6. [Dep. Entomol., Univ. Arkansas]

The larvae of the rice water weevil (*Lissorhoptrus oryzaphilus*) and the grape colaspis (*Colaspis flavida*) may reduce rice yield ; the latter is sometimes responsible for serious reductions in plant stand. Seed treatment with 0·25 lb of aldrin per bu was tested in the field for 2 years and found to give adequate control of both insects and to increase yield by a small but profitable amount. F. s. —E.B.O.

696 Crescini, F. and Villa, G. Il carattere "accestimento" del riso. [**The "tillering" character in rice.**] *Ital. agric.* 1960, **97**, No. 11, 1087–96.

Tillering was studied in the rice variety R.B., medium late, in N. Italy in 1951–2. It was found that, from the ear of the main stem to those of the tillers, the total ear weight, the 1000-grain weight and the average number of grains in the ear decreased considerably, while the number of aborted ears and of poorly developed grains increased. It is concluded that tillering of rice is of only moderate importance in Italy where temperature is a limiting factor during a great part of the vegetative cycle of rice.—E.B.O.

697 Morimoto, I. **A statistical investigation on the heading date, height, number of tillers and yield of rice crop in all over Japan. 2.** [Japanese] *Sci. Reps Hyogo Univ. Agric. (Agric.)* 1959, **4**, No. 1, 19–28, English summary. [Lab. Fd Crop Sci.]

Correlation coefficients were calculated between plant attributes of rice (heading date, height, number of tillers and yield) and factors such as season, geographical situation and variety. F. Eng. s.—D.B.

698 Shimazaki, Y. and others. **Drift of growth and fertility of rice plants influenced by the low temperature in several growth stages. (Studies of cool weather injuries of rice plants in northern part to Japan. 1.)** [Japanese] *Res. Bull. Hokkaido nat. agric. Exp. Sta.* 1960, No. 75, 7–15, bibl. 9, English summary.

Rice was subjected to low-temperatures (13°C and 18°C) for 1 week from the emergence of each leaf, from the 6th to last leaf. The following were the findings after 2 years' investigation. Low temperatures retard leaf elongation, but growth becomes normal again when the treatment ceases. When given at the 3rd-last leaf stage, during which ear primordia are laid down, low temperatures retard heading and result in fewer spikelets. Low temperatures in early growth stages reduce tillering and in late stages reduce grain weight. Rice can recover from low temperatures experienced in early, but not in late, stages of growth. F. Eng. s.—D.B.

699 Hasegawa, G. and Nishikawa, K. **Studies on leaf analysis. 8. The growth and development of leaf, internode and ear on the main stem of rice plant. Seasonal changes of size, dry weight and dry matter percentage of various parts of rice plant, and on the leaf size index.** [Japanese] *Sci. Reps Hyogo Univ. Agric. (Agric.)* 1959, **4**, No. 1, 44–52, bibl. 10, English summary. [Lab. Fd Crop Sci.]

Seasonal changes in leaf and internode morphology in the rice plant were studied. The duration of life of a leaf increased as its position on the stem became higher. Maximum leaf length, width and area (measured) occurred, at the 14th, 12th and 14th leaf, respectively. From the relationship between these 3, leaf area (LA) could be calculated from the formula LA = length × width × 0·7. The length of an internode increased as its position on the plant became higher. The leaf and leaf sheath attained their maximum weight 1 week after elongation was completed. The weight of the sheath, after attaining its maximum, decreased rapidly, and this coincided with the translocation of starch from the sheath. The total weight of leaves and sheaths per stem attained a maximum just before the heading stage and the total weight of internodes per stem reached a maximum 1 week after heading. From their results the authors think that the 8–10th leaves govern tillering, 11–13th leaves govern stem elongation and ear formation, and the 14–16th leaves govern ripening. F. Eng. s.—D.B.

700 Tin, P. T. and Kang, C. N. **Morphological observations on many-kerneled grains in rice.** [Chinese] *Acta bot. sinica* 1960, **9**, No. 1, 98–106, bibl. 12, illus., English summary. [Inst. Bot., Acad. Sinica]

Abnormalities in the structure of spikelets and floral parts of Yü Sze 3, a high-yielding variety, are described, and the frequency with which each of these abnormalities occurs is stated. F. Eng. s.—D.B.

701 McNeal, X. **Rice storage : effect of moisture, temperature, and time on grade, germination, and head rice yield.** *Bull. 621 Arkansas agric. Exp. Sta.* 1960, pp. 23, illus.

These studies were carried out over 3 years using 25-gal tins as bins. Different bins were maintained at 50°, 60°, 70°, 80°, 90° and 100°F. Rice samples were divided into 4 groups containing 15 – 17·9%, 18 – 20·9%, 21 – 23·9% and >24% moisture. A moisture content of 14% or less is regarded as safe. Grade was impaired in 5 days or less, irrespective of temperature, when rice was stored with a moisture content of 15% or more. Germination was impaired in less than a week when rice was stored at 90° or 100°F, irrespective of moisture content, or at 80°F with a moisture con-

tent of 21% or more. Milling performance was affected within a week when rice was stored with a moisture content of 24% or more, irrespective of temperature, and within 3 weeks with a moisture content of 21% at 80°F or higher. Recommendations covering a wide range of circumstances are made regarding the degree of promptness with which rice must be dried or cooled after harvesting. —J.D.J.

702 Catambay, A. B. and others. **Drying of rough rice with heated air in flat bed dryers.** *Philipp. Agriculturist* 1960, **44,** Nos. 2–3, 67–79, bibl. 4 in text. [Central Exp. Sta., Univ. Philippines, College, Laguna]

Paddy, var. Azucena, was harvested at 23% moisture and dried to 14% moisture at ambient temperature, or in a layer 17 in. thick using hot air at 100, 120, 140 or 160°F. The percentage of total milled rice recovered was significantly lower (a) for paddy dried at 160°F than for that dried at lower temperatures, (b) for paddy from the bottom of the layer than for that at the top in the case of rice dried at 160°F. The percentage of head grain recovered from the bottom of the layer was lower than that from the top at drying temperatures of 120°F or higher.—R.B.

703 Tropical Stored Products Information. **Treatment of rice stored in jute bags against insect pests.** *Trop. stored Prod. Inform.* 1960, No. 1, 4–9, illus.

The treatment of storerooms and empty sacks, control of moisture content of rice, dunnage, stacking, and control of pests in stored rice are dealt with. The following are some of the recommendations made : (a) rooms where rice is to be stored should be thoroughly swept, the sweepings burnt and the floor heavily dusted with 1% lindane dust; (b) immediately before stacking, and subsequently every 3 months, the walls of storage premises should be brushed and sprayed with a mixture of lindane wettable powder (25% γ–BHC) and 50% DDT wettable powder (at 6 oz lindane powder plus 8 oz DDT powder/gal water) per 1000 sq. ft of surface ; (c) during stacking of uninfested rice, each layer of stacks should be dusted with 0·5% malathion or 1% lindane at 2 oz per bag ; the sides and top of the completed stack should be sprayed with a malathion wettable powder (at 1 lb of 25% powder/gal water/1000 sq. ft) or with a mixture of lindane and DDT wettable powders as in (b) ; this spraying should be repeated at 3-month intervals ; (d) infested rice should be fumigated with methyl bromide or an ethylene dichloride : carbon tetrachloride 3 : 1 fumigant ; ethylene dichloride and carbon tetrachloride are less toxic to man than methyl bromide, but more experiments are necessary to determine suitable rates of application under various conditions.—E.B.O.

704 Tropical Stored Products Information. **Protection of paddy against insect pests during storage.** *Trop. stored Prod. Inform.* 1960, No. 2, 23–6, illus.

Information is given on methods for protecting paddy stored in bags or in bulk. Some of the methods recommended are the same as for rice [see previous abstract] especially in the case of bag storage. The fumigants recommended for paddy stored in bulk are mixtures of ethylene dichloride and carbon tetrachloride, methyl bromide, and phostoxin (aluminium phosphide).—E.B.O.

GENERAL

705 Department of Agriculture of Western Australia. **Cereals.** *Rep. Dep. Agric. W. Aust. 1959* 1960, 33.

Three treatments, viz. ploughing, scarifying, and no cultivation were applied to a normal clover ley at Wongan Hills following germination of the pasture and also to an area to which a complete herbicide [not specified] had been applied. Without herbicide, ploughed plots yielded 17 bu [grain]/ac and scarified plots 7 bu/ac. Where herbicides were used the yield of ploughed plots was not significantly altered but the yield of scarified plots was increased to almost 13 bu/ac. In trials with a vetch/oats mixture grown for hay in 1958 the combined total yield was greater than that of oats grown alone. The optimum cutting time in relation to the balance between protein content and yield appeared to be later for the mixture than for oats alone.—S.M.J.

706 Larson, C. Kvävegödselns inverkan på kärnskörd och kärnans proteinhalt. [**The influence of nitrogen manuring on yield and protein content of cereals (in Sweden).**] *Växtnärings-Nytt* 1960, **16,** No. 4, 4–8, English summary. [Stat. JordbrFörsök, Uppsala, Sweden]

707 Aristotelous, N. **Cereal seed certification scheme [in Cyprus].** *Countryman, Nicosia* 1960, May-June, 8–9, illus.

708 Duddington, C. L. and Duthoit, C. M. G. **Green manuring and cereal root eelworm [*Heterodera major*].** *Plant Path.* 1960, **9,** No. 1, 7–9, bibl. 4.

The effect of green manuring in reducing the initial eelworm invasion indicated by experiment in 1954 was confirmed in 1955. Crop residues in the soil resulted in increases in the population of fungi predatory on the nematodes.—S.M.J.

709† Stone, L. E. W. **Field experiments on cereal root eelworm.** *Ann. appl. Biol.* 1960, **48,** No. 4, 681–6, bibl. 12. [NAAS, Bristol]

In 1955–9 experiments were carried out in S.W. England on field sites heavily infested by *Heterodera major* to determine its behaviour under various crops. Under 3 common types of ley, the eelworm population fell in 3 years to less than 5% of its original level. Of 6 pure grass stands tested, the eelworm population fell most sharply under cocksfoot and tall fescue. Observation plots under 4 cereals illustrate their different efficiencies as hosts. F. s.—M.H.

710 Balázs, F. A gabonafélék gyökérfelületének mérési módszere. [**Method of measuring the root surface of cereal plants.**] *Kiserl. Kozl.* 1959, **52A**, No. 3, 107–34, bibl. 30, illus. Russian and German summaries. [Agric. Res. Inst., Keszthely, Hungary]

The colorimetric method of measuring cereal-root surface, described, is based on that of Kolossov (1939). Root activity is best characterized by the so-called " specific surface " of the root, this is the ' active,' as distinct from the total surface. Study of roots to a depth of 120 cm in 1955 and 1956 showed great differences both in the quantity of roots and in their active surface. In 1955, when there was a dry spring, the active surface was almost twice as large as the average active surface developed in the wet weather of 1956. F. Ger. s.—G.M.R.

711 Tange, M. **Studies on the depth of the crown of rice, wheat and barley plant. 2. The effect of the temperature on the length of subcrown-internode and the depth of crown. 3. The effect of the light on the length of subcrown-internode and the depth of crown.** [Japanese] *Sci. Reps Hyogo Univ. Agric. (Agric.)* 1959, **4**, No. 1, 53–6 and 57–9. English summaries. [Lab. Fd Crop Sci.]

712 Obolensky, G. **Grafting of plant embryos and the use of ultrasonics. (Investigation on vegetative hybridisation.)** *Qual. Plant. et Materiae veg.* 1960, **7**, No. 3, 273–88, bibl. 15, illus., French summary.

Experiments on the transplantation of embryo pieces and grafting of embryos from wheat into wheat and rye caryopses, and from maize into wheat caryopses, carried out at the Hristinov Government Exp. Sta., USSR, are described.—R.B.

713 Clark, Helena, H. **The application of botanical and archaeological methods to the study of the origin and early history of cereal crops.** *J. King's Coll. agric. Soc. Univ. Durham* 1960, **14**, pp. 10, bibl. 45, illus.

The botanical approach comprises : (a) morphological and anatomical studies, (b) phytogeographical studies, (c) cytological and genetical studies and (d) pollen analysis. The archaeological methods make use of (a) grain impressions on clay, etc., (b) carbonized grain, (c) the stomach contents of 2 pre-historic men and (d) radio-carbon dating. —C.L.S.

714 Johannes, H. Beiträge zur Lagerungsbeizung feuchten Getreides. I. [**Seed treatment of stored moist cereal grain. 1.**] *NachrBl. deutsch. PflSchDienst.* 1960, **12**, No. 12, 177–85, bibl. 14. [Biol. Bundesanst., Lab. f. Botanische Mittelprüfung, Braunschweig, German Fed. Rep.]

In this series of experiments on storage of seed of wheat, oats, barley and rye it was consistently shown that increase in moisture content and of the storage period of the seed lowered germination capacity and that treatment with a phenyl Hg compound was better than one with an ethyl Hg compound, which had a noticeably higher vapour pressure. Damage by the Hg compound is intensified when seed which has been harvested dry takes up water during storage. F. Ger. s.—D.B.

715† Taranov, M. T. and others. [**The preservation by chemical treatment of fodder grain with high moisture content.**] [Russian] *Zemledelie (Agriculture, USSR)* 1960, **8**, No. 9, 53–7.

Although more than 500 chemical preparations for preserving grain have been the subjects of experiments, hitherto no one substance has been satisfactory from all aspects. Following many trials, the authors selected sodium pyrosulphite as producing the least amount of decomposition products harmful to animals. It is claimed that if 8–12 kg sodium pyrosulphite is mixed with 1 ton of grain having 22–35% moisture content, the grain is preserved well during 38 days' storage. The grain in the control deteriorated in 7–8 days. If the treated grain shows signs of heating in 30–35 days, a further treatment with 7–8 kg sodium pyrosulphite per ton of grain will maintain the harvested product in good condition for another 20–30 days.—M.H.

716 Brown, C. W. and Myers, Amy. **Long term cereal storage.** *Agric. Gaz. N.S.W.* 1960, **71**, Pt 7, 348–55, illus.

LEGUMES

SOYABEANS

See also Abs. 629

717 Caviness, C. E. and Smith, P. E. **Effect of different dates and rates of planting soybeans.** *Rep. Ser. 88 Arkansas agric. Exp. Sta.* 1959, pp. 19, illus.

Trials at 3 centres for 4 years showed that sowing in May was better than in April or June, and that mid-season varieties yielded more than early varieties at all sowing dates. Very early sowings grew slowly and flowered when the plants were still short, so that final plant height was reduced. As a result weeds were not reduced by shading, and the pods were too low for efficient combine harvesting. Late sowing, on the other hand, was conducive to lodging, because the plants attained normal height without making strong stems. Reducing seed rate from 1 to 0·3 bu/ac reduced the yield of an early variety, but not of a mid-season variety, though in the latter the plant height was reduced (with the objections regarding weeds and harvesting already noted).—J.D.J.

718 Institut National pour l'Étude Agronomique du Congo Belge. **[Soyabeans.]** *Rep. INÉAC 1959* 1960, 432. [Sta. Rech. Agron. Mulungu-Tshibinda, Kivu]

The soyabean varieties Yro 9 and Easy Cook yielded 1443 and 1411 kg of seed/ha, respectively. —E.B.O.

719 Morgan, B. S. **Post-emergence applications of NPA (alanap) and falone (tris (2,4-dichlorophenoxyethyl) phosphite) granules on soybeans.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 53. [Received May, 1960]

Alanap granules at 2, 4 and 8 lb. a.i./ac and falone granules at 4 and 8 lb a.i./ac, applied when soyabean plants were 3–4 in. high, controlled giant foxtail (*Setaria faberii*) without injury to the soyabeans.—A.M.H.

720 Smith, R. J., Jr. **Effect of low rates of several phenoxyalkylcarboxylic acids on soybeans** [Abstract]. *Proc. S. Weed Conf.* [*USA*] 1960, **13**, 243–4. [Agric. Res. Serv. USDA, Stuttgart, Arkansas]

The comparative effects of several phenoxyalkylcarboxylic acids, applied at rates equivalent to spray drift, on the growth and yield of soyabeans were investigated. Amine salt and/or ester formulations of 2,4-D, 2,4,5-T, 2-(2,4,5-T)P (silvex) and 4-(2,4-DB) were applied at 0·01, 0·05, 0·10 and 0·25 lb/ac to Lee soyabeans in the vegetative and bloom stages. Silvex and 2,4,5-T significantly delayed maturity of soyabeans when applied at the bloom stage. All the chemicals used caused proliferation of tissue on the periphery of the stems and petioles. Spraying at either growth stage reduced yields, but the greatest reduction was on plots sprayed at the vegetative stage. In 1958, 2,4-D, 2,4,5-T and silvex reduced yields by 12, 23 and 40%, respectively, and in 1959, 4-(2,4-DB), 2,4-D, silvex and 2,4,5-T reduced yields by 14, 22, 38 and 48%, respectively. Yield reductions were significant with silvex and 2,4,5-T at 0·1 lb/ac and 4-(2,4-DB) and 2,4-D at 0·05 lb/ac.—A.M.H.

721 Miksche, J. P. **Developmental vegetative morphology of *Glycine max*.** *Diss. Abstr.* 1960, **20**, No. 7, 2514. [Iowa State Univ., Ames]

GROUNDNUTS

722 Cornejo, J. La culture de l'arachide en Espagne. **[Groundnut cultivation in (Valencia) Spain.]** *Oléagineux* 1961, **16**, No. 1, 1–8, illus. [Sta. Hort. Valencia, Spain]

723 Evans, A. C. **Studies of intercropping. 1. Maize or sorghum with groundnuts.** *E. Afr. agric. for. J.* 1960, **26**, No. 1, 1–10. [Dep. Agric., Dar es Salaam, Tanganyika]

In experiments carried out at Ilonga and Mwanhala during 1947, and again at Mwanhala in 1958, groundnuts were grown (a) with maize and with sorghum, (b) alone. At Mwanhala an application of 130 lb double superphosphate at sowing and a top dressing of 130 lb/ac $(NH_4)_2SO_4$ were necessary. Groundnuts were sown at high, medium and low seed rates in pure stands and in combination with maize or sorghum. Over a wide range of populations, intercropping groundnuts with maize or sorghum resulted in higher yields than when either was grown alone. The presence of weeds in the row caused the same percentage reduction in yields of pure stands of groundnuts as when another crop was grown. In another experiment, groundnuts at 3 population densities were grown with maize at 3 population densities (a) in alternate rows, (b) maize at 3 plants per hill, groundnuts uniformly distributed, (c) maize and groundnuts uniformly distributed in the row. Methods (a) and (b) were not significantly better than method (c).—S.M.J.

724 Gillier, P. and Prevot, P. Fumures minérales de l'arachide au Sénégal. **[Chemical manuring of groundnuts in Senegal.]** *Oléagineux* 1960, **15**, No. 11, 783–91, bibl. 8, illus. [Inst. Rech. Huiles et Oléag., Paris]

725 Institut National pour l'Étude Agronomique du Congo Belge. **[Groundnuts.]** *Rep. INÉAC 1959* 1960, 84, 309, 311, 344, 364, 374 and 515.

The groundnut variety P 43 is being multiplied for distribution to farmers. Other varieties being multiplied are A 1052, A 1055 and A 65. At Boketa Station the 3-yr average yield of the varieties E 4/2 and E 63 (2081 and 2076 kg of seed/ha, respectively) exceeded the yield of the control A 65 (1839 kg).—E.B.O.

726 Hauser, E. W. and Thompson, J. T. **Efficiency of selected herbicides and herbicidal mixtures for weed control in peanuts** [Abstract]. *Proc. S. Weed Conf.* [*USA*] 1960, **13**, 47–8. [Georgia Exp. Sta., Tifton, USA]

Seven herbicides were evaluated at standard rates, as mixture components (i.e. at half standard rate) and in mixtures for pre-emergence or at-emergence weed control in groundnuts. Pre-emergence treatments were applied on 2 May 1959, and at-emergence treatments on 8 May. On 26 May the average estimated % weed control obtained with the standard treatments was as follows: ABA (3-amino-2,5-dichlorobenzoic acid), 61 ; sesone (Na 2,4-dichlorophenoxyethylsulphate), 65; TEP (tris-(2,4-dichlorophenoxyethyl)-phosphite), 69 ; dinoseb, 69 ; chlorpropham, 80 ; simazin, 93. The half-rate mixture components gave weed control values ranging from 30% for ABA to 69% for simazin. None of the pre-emergence mixtures gave better weed control than the respective standard treatments. When dinoseb was used mixed with pre-emergence herbicides and the mixtures were applied at the emergent stage, there were marked increases in herbicidal activity, except in the case of chlorpropham. Estimated weed control on 26 May for these mixtures was : chlorpropham/dinoseb, 79% ; sesone/dinoseb, 87% ; EPTC/dinoseb, 96% ; ABA/dinoseb, 97% ; TEP/dinoseb, 98%. Some temporary injury to the groundnuts resulted when TEP, ABA or chlorpropham was used in combination with dinoseb.—A.M.H.

727 Purss, G. S. **Further studies on the control of pre-emergence rot and crown rot of peanuts.** *Qd J. agric. Sci.* 1960, **17**, No. 1, 1–14, bibl. 8. [Div. Pl. Indust., Qd Dep. Agric. and Stock]

Agrosan (1% Hg), harvesan, ceresan and drisan (each containing 1·5% Hg) and captan gave the most consistent control of pre-emergence rot (caused by *Rhizopus arrhizus*). A combination of 1 part captan plus 5 parts of an organic mercurial compound gave the best control over both pre-emergence rot and crown rot caused by *Aspergillus niger*.—S.M.J.

728 Tropical Stored Products Information. **Infestation problems of the groundnut industry in the Gambia.** *Trop. stored Prod. Inform.* 1960, No. 2, 27–30, bibl. 10.

Control measures are given.—E.B.O.

729 Green, A. A. and others. **Control of insects infesting groundnuts. Infestation of decorticated nuts.** *Pest. Infest. Res.* 1959, 17–18.

The experiments reported in *Fld Crop Abstr.* 13 : 1227 were continued using larger, i.e. 156-lb sacks. The high level of control of *Tribolium castaneum* obtained in smaller sacks with applications of 80 mg malathion/sq. ft/4 weeks was not obtained in 156-lb sacks. Subsequent tests have shown that insects confined at various positions inside a small sack were killed without coming into contact with the treated sacking and that this toxic effect decreased with increasing distance from the surface. Small sacks had a much higher proportion of treated surface area to a given weight of nuts than the large sacks and the insects had less opportunity to move well away from the treated surface. Insects confined at different positions in the small sacks were killed without coming into contact with the treated sacking and the toxic effect decreased with increasing distance from the surface. Aggregation of insects caused local, high population densities within the large sacks, and with the increased insulation afforded by the larger bulk of nuts, temperatures up to 36·8°C were produced, and, consequently, rapid increase in insect population occurred.—S.M.J.

730 Bunting, A. H. and Anderson, B. **Growth and nutrient uptake of Natal Common groundnuts in Tanganyika.** *J. agric. Sci.* 1960, **55**, Pt 1, 35–46, bibl. 13. [Dep. Agric. Bot., Univ. Reading and Tanganyika Dep. Agric.]

Methods of growth analysis were used to study the accumulation of dry matter in 2 Natal Common groundnut crops grown at Kongwa, Tanganyika, at (a) a relatively low plant population (26,000/ac) with P fertilizer, and (b) a plant population of 56,000/ac without fertilizer. In the (a) series the kernels constituted 45% of the total dry weight (32·7 g) of the plant at maturity and in the (b) series the total plant dry weight was 20·6 g, with a kernel yield of 10·4 g. The uptake and distribution of N, P, K, Mg and Ca was followed in (a). Total N uptake in (a) was 63 lb/ac with 45 lb in the mature kernels which, in the first two-thirds of the crop's life, went into the vegetative parts, but in the final stages went into the kernels with some evidence of translocation of N from the vegetative parts and the shells. Leaf-area ratio and relative growth rate were associated with the rate of N uptake per unit of plant dry weight. Total uptake of P was 4 lb/ac, of which 80% was contained in the kernels at maturity. There was considerable evidence of translocation of P into the kernels from the vegetative parts of the plant. P uptake was heavily reduced in a mid-season dry period. The total amount of K found in the crop at maturity was about 26 lb/ac, mostly in the vegetative parts with less than 20% in the kernels, although these constituted 45% of the total dry weight. From incomplete evidence it is suggested that the maximum accumulation of Ca was approx. 10 lb/ac, almost all in the vegetative parts, and that of Mg about 5 lb/ac, of which 2 lb were in the kernels. F. s.—S.M.J.

PEAS

731 Laumont, P. and Chevassus, A. Note sur l'amélioration du pois rond en Algérie. **[Note on the improvement of peas in Algeria.]** *Ann. Éc. Agric. Alger* 1960, **2**, No. 1, pp. 23, bibl. 24, illus.

Information is given on peas (*Pisum sativum*), particularly on recommended varieties.—E.B.O.

732 Lubatti, O. F. and Bunday, Greta. **The water content of seeds. 1. The moisture relations of seed peas etc.** *J. Sci. Fd Agric.* 1960, **11**, No. 12, 685–90, bibl. 12, illus. [Imp. Coll. Fld Sta., Silwood Park, Sunninghill, Berks]

A method for determining the hygroscopic equilibrium curve of seed peas is described. This curve is compared with the equilibrium curve of broad beans and lucerne seed. F. s.—S.M.J.

733 Franssen, C. J. H. Het vaststellen van de door de erwteknopmade (*Contarinia pisi*) veroorzaakte schade en de bestrijding van dit insekt. **The determination of damage caused by *Contarinia pisi* and the control of this insect.** *Tijdschr. PlZiekt.* 1960, **66**, No. 4, 249–58, bibl. 28, illus., English summary. [Inst. PlZiektenk. Onderz., Wageningen, Netherlands]

[cf. *Fld Crop Abstr.* 14 : 235.]

734 Legowski, T. J. and Gould, H. J. **Losses of dry harvesting peas due to pea moth [*Enarmonia nigricana*] in East Anglia and the economics of control measures.** *Plant Path.* 1960, **9**, No. 4, 119–26, bibl. 2. [NAAS, Cambridge]

735 Scheffer, F. and others. Chromatographische Untersuchungen über den Einfluss von Kalium- und Phosphat-Düngung auf den Gehalt von einigen Aminosäuren in Erbsen. **[Chromatographic investigation of the effect of potassium and phosphate manuring on the content of some amino acids in peas.]** *Qual. Plant. et Materiae veg.* 1960, **7**, No. 4, 329-40, bibl. 10, illus., English and French summaries. [Univ. Göttingen, W. Germany]

Peas, var. Kleine Rheinländerin, were grown in pot trials at 3 levels of P and of K. Although the yield and crude-protein content of peas harvested green and ripe were influenced by the levels of P and K, there was no correlation between manuring and amino-acid composition. —R.B.

736 Pálfi, G. Adatok a borsó (*Pisum sativum* L.) gümöbaktériumainak nitrogénfixálásához, különböző zöldtrágyák után. **[Nitrogen fixation by root nodule bacteria of *P. sativum* after different green manures.]** *Kisérl. Közl.* 1959, **52A**, No. 3, 55–66, bibl. 9, illus. German summary. [Agric. Res. Inst., Szeged, Hungary]

After winter wheat, peas were grown under different green-manure crops, namely, *Sinapis alba*, *Lathyrus* and sunflowers, and were studied by means of sap analysis of the pea plant at different stages of development (24, 35 and 56 days), while at the same time root-nodule development was examined. Determination of the amount of nitrate and organic N in the pea sap showed sunflowers to be the best as green manure. This is attributed to the pentosan effect of the large quantity of green mass present in the soil, which furnishes optimal conditions for root-nodule bacteria. Study (also by means of plant-sap analysis) of the winter-wheat crops which followed peas grown under each form of green manure, showed those wheats to be best supplied with mineral nutrients (N, P, K) which had followed the peas manured with sunflowers, and this advantage was reflected also in the wheat yields obtained. F. Ger. s.—G.M.R.

737 Sale, P. J. M. and Vince, Daphne. **Effects of light and gibberellic acid on internode growth in *Pisum sativum*.** *Physiol. Plant.* 1960, **13**, No. 4, 664–73, bibl. 11. [Univ. Reading, Hortic. Res. Labs, Shinfield]

Tall and dwarf varieties of *Pisum sativum* were grown in darkness or exposed to blue (400-520 mμ), red (600–700 mμ) or infra-red (> 700 mμ) radiation, and GA was applied at the beginning of each daily irradiation period, as an approx. 5% ethanol solution containing 80 mg GA/l. The application of GA partly prevented the inhibition of internode elongation by light. In all cases internode lengths of plants in the light treatments + GA were less than those of plants grown in the dark + GA, although elongation following the application of large doses of GA was greater in the light than in the dark. In dwarf varieties the shortest internodes always occurred in red light. In tall varieties the shortest internodes occurred with red irradiation when 15 min. irradiation periods were used, but in longer periods blue light became increasingly more effective than red in inhibiting internode elongation. These different responses of tall and dwarf varieties to red and blue light were almost completely eliminated when GA was applied. In dwarf peas, infra-red radiation, with and without GA application, largely reversed the effect of a previous red light treatment but had less effect following a blue treatment. There was no interaction between GA and infra-red, both caused internode elongation and were almost completely additive in their effects.—S.M.J.

BAMBARRA GROUNDNUTS

738 Institut National pour l'Étude Agronomique du Congo Belge. **[Bambarra groundnuts.]** *Rep. INÉAC 1959* 1960, 229 and 231.

In selection trials at Kiyaka Experimental Station the yields of varieties of Bambarra groundnuts [*Voandzeia subterranea*] ranged from 1725 to 1792 kg of seed/ha. In cultivation trials the highest yields were obtained from sowing at a depth of 3–6 cm.—E.B.O.

CHICKPEAS

739 Nirad, S. K. and others. **Effects of spacing on gram** [*Cicer arietinum*]. *Indian J. Agron.* 1960, **4**, No. 3, 148–53, bibl. 4. [Agric. Coll., Bapatla, Andhra Pradesh, India]

The different spacings of 3, 6, 9, 15 and 18 in. had very little effect on height of the plants, but the number of branches, pods and seeds, the dry weight and yield per plant increased with wider spacings. The highest yield was obtained with 12 × 6 in. spacing in plots without manure in 1955–6, and with 12 × 12 in. spacings in manured plots in 1956–7. F. S.—A.G.G.H.

LENTILS

740 Laumont, P. and Chevassus, A. Notes sur l'amélioration de la lentille en Algérie. [**Notes on the improvement of lentil in Algeria.**] *Ann. Éc. Agric. Alger* 1960, **2**, No. 3, pp. 35, bibl. 33, illus.

LUPINS

741† Winkler, H. and Lustig, H. Odlingsförsök med sötlupiner utförda vid Statens Försöksgård Flahult. I. Stamförsök med gul och blå sötlupin åren 1951–1959. II. Ogräsbekämpningsförsök i gul sötlupin åren 1955–59. [**Sweet lupins in cultivation trials at the Flahult Experiment Farm, Sweden. 1. Varietal trials of yellow and blue sweet lupins, 1951-9. 2. Weed control experiment in yellow sweet lupin cultivation, 1955-9.**] *Medd. Stat. JordbrFörsök, Uppsala* 1960, No. 110, 1–21, bibl. 50, German summary.

In a 9-year trial of 3 yellow sweet lupins [*Lupinus luteus*], the Danish variety Neven gave the highest green yield, averaging 52,600 kg/ha, followed, in order of productivity, by the common yellow sweet lupin Strain 8 and by the control variety Weiko III, the 2 latter from Müncheberg, Germany. The Svalöf variety Borre and the Danish Namar, being the 2 blue sweet lupins [*L. angustifolius*] tested at the same time, although distinguished by a higher content of dry matter and crude protein than the yellow varieties (so that their yield of these components approximated that of Weiko III) were inferior to all the yellow varieties in green yield. They were also inferior as silage plants, having hard stems and low leaf/stem ratio and producing unpalatable silage. In a weed control trial with yellow sweet lupins, comparison was made of spraying 6 and 8 l/ha, respectively, of premin (amine salts of dinitrobutylphenol) (a) immediately before crop emergence and (b) 4–5 days after emergence. Pre-emergence treatment with 6 l/ha increased green yield by 35–40% and dry-matter yield by 9–13%. Increasing the rate to 8 l/ha depressed rather than increased yield. Post-emergence spraying caused serious leaf burn and correspondingly heavy diminution of yield. Premin treatment resulted in double (1959) and in nearly treble (1957) the yield of the untreated plots.—G.M.R.

742 Silva, G. M. and Oliveira, A. J. de. **Experiments on control of the pests of the yellow lupin (*Lupinus luteus* L.). 2. Cultural practices.** *Agron. lusit.* 1959, **21**, No. 2, 123–34, bibl. 2, Portuguese summary. [Esta Agron. Nac., Sacavém, Portugal]

[For Part 1 see *Fld Crop Abstr.* 13 : 1768.]

PIGEON PEAS

743 Gooding, H. J. **Some problems of pigeon pea improvement.** *J. agric. Soc. Trin. Tob.* 1960, **60**, Pt 3, 321–38, bibl. 13, illus. [Fac. Agric., Univ. Coll. W. Indies]

Some previous investigations with pigeon pea [*Cajanus cajan*] at the former Imperial College of Tropical Agriculture are reviewed. In an experiment to investigate the effect of time of sowing pigeon peas on the time taken to mature, 7 cultivars were sown on 3 dates. There was greater variation between cultivars in the time taken from sowing to the onset of pod formation following an April sowing than following a sowing at the end of July. The July sowing resulted in the smallest plants. Flowering could be inhibited in 2 early dwarf cultivars by long-day treatment.—S.M.J.

ROOT CROPS

SUGAR-BEET

744 Obolensky, G. and Tartchinski, S. Production de betterave sucrière par transplantation. [**Sugar-beet growing using transplantation.**] *Qual. Plant. et Materiae veg.* 1960, **7**, No. 4, 359–70, bibl. 25, illus., English and German summaries.

A method for growing sugar-beet, involving transplanting seedlings at a stage when the tap roots are no thicker than straw, is proposed. Such transplantation requires 10–12 workers to plant 1 ha during a 10-hr working day, but machine planting is a possibility. The method was employed on a 1-ha field near Skivanj, Yugoslavia, where 2 sowings of sugar-beet had failed. Thin-

nings from another field sown in mid-April were transplanted on 29 May, 1 day after flood irrigation, in rows 55–60 cm apart at a spacing of 25-30 cm in the row, instead of at the recommended spacing of 15–16 cm in rows 45 cm apart. The crop was irrigated 3 times during the growing season and yielded 60 tons roots plus 40 tons tops/ha when harvested on 1 Oct. It was estimated that yields of roots from fields planted out at the end of March would be *c.* 100 tons/ha. Provided that tap roots are not damaged during planting and part of the foliage is removed, the proportion of fanged roots obtained is negligible. By using the method described, it is possible to grow sugar-beet either immediately before or immediately after winter cereals.—R.B.

745 Kurten, P. W. and Wobst, H. Ergebnisse mehrjähriger Versuche mit Beregnung und Zusatzdüngung zu Zuckerrüben. [**The results of several years' experiments on irrigation and supplementary manuring for sugar-beet.**] *Z. Acker- u. PflBau* 1960, **111**, No. 1, 92–8, bibl. 13, English summary.

In 4 experiments with sugar-beet on very light sandy soil, carried out during 1953, '54, '55 and '57, yields of 490–700 hkg/ha of roots, 81 – 119 hkg/ha of sugar, and 260 – 450 hkg/ha of leaf were obtained by a combination of heavy manuring and irrigation. Irrigation and supplementary manuring in combination, interacted so as to increase the effects of each. In 3 experiments carried out in 1955, '57 and '58, also on very light sandy soil, when additional irrigation was given, 2 top dressings of 30 kg N/ha during July and August gave better results than one manuring of 60 kg N/ha in July or August. F. Eng. s.—D.B.

746 Milică, C. I. Contribuţii la problema hrănirii suplimentare extraradiculare a speclei de zahăr. [**Contribution to the study of supplementary foliar nutrition of sugar-beet.**] *Anal. Inst. Cercetări agron.* 1958–59, **26**, Ser. A. 21–43, bibl. 38, Russian and French summaries. [Romania]

Nutrients were given by spraying sugar-beet leaves with simple or compound solutions of ammonium nitrate, potassium salts, superphosphate, boric acid, manganese chloride and copper sulphate. Thirty-eight variants with 3 replications were employed in order to determine the most effective solution, the best time to apply it and the number of applications necessary. Spraying was done from 1 to 4 times, at different stages of plant growth. It was found possible thus to increase root production by up to 13,632 kg per ha, or 26%, and leaf production by up to 5665 kg per ha, or 44%. Irrigation with complete solutions of NPK or of N P K B Mn Cu gave the most satisfactory results. For solutions containing P and K, the best time to apply was in Sept., 3 to 5 weeks before harvesting. For solutions of boric acid and ammonium nitrate, the best time for application was August, or even earlier. The greater the number of applications, the greater was the root crop. Crude-sugar content was increased by as much as 3932 kg per ha or 35% by the sprays. Other points studied were the effects upon content of dry matter and protein, the proportion of plants attacked by heart rot, the accumulation and translocation of carbohydrates, and the intensity of chlorophyll assimilation. F. Fr. s.—G.M.R.

747 Margara, J. and Touvin, H. Analyse du comportement en champs d'essais de quelques variétés de betteraves sucrières cultivées en France. 2. Essais effectués en 1954, 1955 et 1956. [**Study of the behaviour in field trials of some sugar-beet varieties grown in France. 2. Trials in 1954-6.**] *Ann. Amélior. Pl., Paris* 1960, **10**, No. 1, 53–60, bibl. 2, English, German and Russian summaries. [Sta. Amélior. Pl., Versailles, France]

The results are given of trials to compare 11 sugar-beet varieties in 8 localities in France. Tables give percentages of sugar in the roots, root weight (g/root) and sugar yields (g/root). The differences between years and localities were considerably greater than those between varieties, but these differences did not result in important changes in the general classification of varieties. The polyploid varieties yielded well and had high sugar contents.—E.B.O.

748† Kamra, S. K. **Techniques for identifying varieties of *Beta vulgaris* in the laboratory.** *Indian J. Genet.* 1960, **20**, No. 2, 126–35, bibl. 12, illus. [Seed Testing Sta., Münster i. Westfalen, German Fed. Rep.]

This is largely the English version of a previous paper published in Germany (*Fld Crop Abstr.* 12 : 1346). Those methods which did not adequately distinguish between varieties of *B. vulgaris* are given more detailed attention in this paper. These methods are : seed treatment with (a) streptomycin sulphate, (b) absolute alcohol, (c) $KClO_3$, (d) soaking in water; photometric measurements of the liquid in which roots of the seedlings had been growing; refractometric measurement of the sugar content of the seedlings; and paper chromatography.—D.B.

749 Botteau, R. and others. Étude d'un nouveau désherbant sélectif des cultures de betteraves sucrières. [**Study on a new selective herbicide for sugar-beet crops.**] [n.d.], pp. 15, bibl. 6. [Inst. Tech. Betterave, Paris] [Received Oct., 1960]

Herbicidal trials were carried out in 1959 with HS-55 [formula given] sprayed at 4–6 l/ha at the

sowing of sugar-beet or within the 5 days following, or applied in granular form (0·675% HS-55) at 150 kg/ha before or after emergence. The best control of weeds and the least damage to sugar-beet seedlings was obtained by the granular treatment, followed closely by a 4 l/ha spray, both applied at sowing or immediately after. 21 days after the best treatment the number of weeds was 4 times less than in the untreated control. *Chenopodium* sp., *Stellaria media*, *Spergula* sp. and *Matricaria chamomilla* were destroyed. Trials are to be continued.—E.B.O.

750 HALL, J. W. **Weed control in sugar beets in Manitoba.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 14. [Received May, 1960]

Control of broad-leaved weeds in sugar-beet with herbicides was not successful. For control of wild oats, propham at 4–5 lb/ac and avadex at 2 lb/ac, well incorporated into the soil before sowing, are recommended. TCA at 4–6 lb/ac applied either as a pre- or post-emergence spray was very reliable for the control of green foxtail (*Setaria viridis*).—A.M.H.

751 LAZAR, O. Métabolisme respiratoire de la betterave sucrière. 8. Respiration des plantules polyploïdes et des plantules diploïdes. [**Respiratory metabolism of sugar-beet. 8. Respiration of polyploid seedlings and diploid seedlings.**] *Sucr. belge* 1959, **78**, No. 5, 201–9 and No. 6, 237–48, bibl. 4.

It is concluded that in the first stages of the vegetative cycle of sugar-beet, polyploid glomerules have a more active respiration than diploid glomerules. In later stages there is no significant difference in respiration between the 2 types.—E.B.O.

752 AMBERGER, A. Einfluss der Borernährung auf Atmungsintensität und Qualität der Pflanzen. [**Influence of boron nutrition on respiration intensity and quality of plants.**] *Landw. Forsch.* 1960, Sonderheft 14, 107–13, bibl. 22. [Agric. Chem. Inst. Weihenstephan, Tech. Hochsch. München, Freising-Weihenstephan, Bavaria, Ger. Fed. Rep.]

In pot experiments the influence of various levels of boron nutrition on the activity of oxidation enzymes in sugar-beet leaves and on the quality of the beets was studied. Plants supplied with the optimum quantity of B had a normal (relatively low) respiration rate, a high sugar-content and a low content of amides and free amino acids.—D.B.

753 MIZUNO, T. and others. **Distribution of sugars in the sugar-beet root.** [Japanese] *Bull. Fac. Agric. Shizuoka* 1959, No. 9, 53–6, bibl. 5, illus., English summary.

The sugars detected by chromatography in the root of sugar-beet were saccharose, glucose, fructose and raffinose. The content of these sugars in each of 10 sections of the root (the internal and peripheral tissues of 5 vertical layers of root) was determined for 2 varieties which are identified as 'normal' and 'seed-stalk developed'. In the normal variety the saccharose content of the lower part of the root is higher than that of the upper part, but the content of reducing sugars is highest in the middle portion ; the content of each type of sugar is higher inside than near the periphery of the root. In the seed-stalk developed variety the sugar content is higher than in the normal variety, and it is higher in the peripheral than in the internal tissues. F. Eng. s.—D.B.

754 VIDAL, A. A. Determinación de betaína en remolacha azucarera (*Beta vulgaris*). [**Determination of betaine in sugar-beet (*B. vulgaris*).**] *Rev. Fac. Agron., La Plata* 1959, **35**, No. 2, 147–55, bibl. 15.

Determinations of betaine and choline were made in root samples of 29 sugar-beet varieties from the Chacra Experimental de Yráizoz, Buenos Aires province. The percentages of betaine found were much greater than those of choline. In general all the varieties had high percentages of sugar which was not related to the betaine and choline content. —E.B.O.

755 UENO, K. and others. **Studies on prevention to decrease sugar content in sugar beets. (1) On effect to inhibit bolting on sugar beets (1).** [Japanese] *Sci. Reps Hyogo Univ. Agric.* (*Agric.*) 1959, **4**, No. 1, 33–6, illus., English summary. [Sasayama Exp. Farm]

Some side effects are recorded of spraying sugar-beet plants before flower initiation with maleic hydrazide (MH) at a concentration of 0·25 and 0·5% to prevent bolting. There was renewed growth within 6–9 weeks after treatment, and plants lost apical dominance. The palisade tissue and spongy parenchyma of the leaves thickened. In the roots there was a decrease in the content of protein and peroxidase and an increase in reducing sugars, inorganic phosphate, ammonium- and nitrate-N, dehydrogenase and polyphenols. F. Eng. s. —D.B.

756 HAYASHI, S. and AKITA, K. **Studies on sugar beet bolting in warm region. (1) On the time of initiation and development of the floral axis.** [Japanese] *Sci. Reps Hyogo Univ. Agric.* (*Agric.*) 1959, **4**, No. 1, 1–4, bibl. 8, illus., English summary. [Kakogawa Exp. Farm]

The initiation of the floral axis in sugar-beet took place from late Feb. to early March. From April onwards the root ceased to be a sugar-storage organ. F. Eng. s.—D.B.

FODDER-BEET

757† Slaats, M. and Stryckers, J. Bestrijding van *Ornithogalum umbellatum* L. op akkerland vóór voederbieten. [**Control of *O. umbellatum* on arable land before growing fodder-beet.**] *Beknopt Versl. nat. Centr. Grasland- en Groenvoederonderz. 1958-1959* 1960, 41–2.

Ploughed arable land was treated with MH, propham or chlorpropham at 5, 10 or 20 kg/ha, or with amitrol at 10, 15 or 20 kg/ha, on 5 March 1958 when *O. umbellatum* was 5–20 cm tall. One year after treatment, the infestation on plots treated with MH was 50–75% of that originally present. Similar results were obtained using amitrol, but only at uneconomic rates (15 or 20 kg/ha). Propham and chlorpropham gave poor control and the latter damaged a following crop of fodder-beet. High rates of amitrol were toxic to fodder-beet sown 1 month after treatment, and a thin stand resulted. Propham and MH at the above rates were non-toxic to fodder-beet.—R.B.

SWEDE-TURNIPS

758† Waterson, H. A. **Swede variety trials in the west of Scotland, 1955-1957.** *J. nat. Inst. agric. Bot.* 1959, **8**, No. 3, 640–50, bibl. 7. [W. Scot. Agric. Coll.]

The results are given of 23 trials with swedes [*Brassica napus* var. *napobrassica*] in W. Scotland. Total and dry-matter yields and yields of tops and roots are given for the varieties Peerless, Stirling Castle, Aberdeenshire Prize, Darlington, Parkside White Fleshed and Wilhelmsburger. F. s.—S.M.J.

POTATOES

759 Kartoffelbau. [**Ten years' progress in potato cultivation.**] *Kartoffelbau* 1960, **11**, No. 7.

This issue is devoted to brief summaries which indicate the progress made in Germany during the past decade in the following aspects of potato cultivation : the use of manures and mineral fertilizers ; plant protection ; mechanization ; industrial uses of potatoes ; processing of potatoes; potatoes as animal fodder.—D.B.

760 Dimitrescu, Maria and others. Contribuţii la agrotehnica culturii de vară a cartofului. [**Cultivation measures in growing potatoes in summer.**] *Anal. Inst. Cercetări agron.* 1959/60, **27**, Ser. B, 63–81, bibl. 13, French and Russian summaries.

The results of trials in the summer-growing of potatoes are reported for 3 zones in Romania. In zone 1, having very favourable conditions, good results were obtained by planting after peas between 20 June and 1 July, planting distance 60 × 40 cm, planting depth about 7 cm. In zone 2, with somewhat less favourable conditions, planting was done after peas between 1 and 10 July. In zone 3, the least favourable of the zones, planting was done in open soil which had received autumn manuring, in the first half of July for semi-late varieties, in the second half of July for early varieties, which gave abundant crops and were very productive in the following year. Planting distance in the less favourable zones was 70 × 30 or 70 × 35 cm, and planting depth 12 cm. Hilling is necessary only in irrigated cultivation and in rainy years, in the favourable regions. Both in the mountain region and in the plains, the best yields are obtained by harvesting after white frost. Abundant and steady yields are obtainable in summer under irrigation. F. Fr. s.—G.M.R.

761 Veselovskiĭ, I. A. and Amirov, Z. **Late autumn planting of double-harvest varieties of potato.** [Russian] *Vestn. S.H. Nauki* (*J. agric. Sci. USSR*) 1960, **5**, No. 10, 39–40, bibl. 5.

Under the ecological conditions of Apšeron [40°N., 50°E.] potatoes should be grown only as double-harvested crops. The Azerbaĭdžan Agric. Inst. recommends the varieties Šuntukskiĭ, Radžabli and Hibinskiĭ (early type). These give 2 good harvests per annum (15 June and at the end of November) and provide sound seed tubers. It is also claimed that late autumn plantings result in better yields than do spring plantings.—M.H.

762 Norfolk Agricultural Station. **Potatoes. Chitting and fertilizer placement.** *Rep. Norfolk agric. Sta. 1959-60* 1960, No. 52, 9–10.

During experiments in 1957–9 the effect of placement of fertilizer on the yield of chitted and unchitted potato tubers was investigated. The effect of fertilizer placement below and in contact with the seed was not serious for unchitted seed tubers and yields in 1957 and '58, were about 1 ton/ac higher than from plots where fertilizer was broadcast, but emergence of chitted tubers was delayed by fertilizer placement. The adverse effect was greatest when fertilizer was placed directly under the seed as well as in rows to the side of the seed. In the first year the difference in yield between the 2 placement treatments was 1 ton ware tubers/ac.—S.M.J.

763 Svensson, B. Matpotatisens kvalitet. 2. Litteraturöversikt Kvävegödsling av potatis. [**The quality of table potatoes. 2. Review of literature concerning nitrogen fertilization.**] *Medd. 101 Stat. JordbrFörsök, Uppsala* 1959, pp. 20, bibl. 55, English summary.

764 Avram, P. and others. Turba de mlaştini joase ca îngrăşămînt organic la cartof. [**Entrophic peat as organic fertilizer in**

potato growing.] *Anal. Inst. Cercetări agron.* 1958–59, **26**, Ser. A, 95–108, bibl. 6, Russian and French summaries. [Romania]

At 2 agricultural experiment stations in Romania, aerated peat was applied to potato crops during 1954–7 at rates of 20 and 40 tons per ha, producing for the 20 ton variant average increases in yield of 11% and 13% and for the 40 ton variant 13% and 18% respectively. Peat applied direct did not give such good results as f.y.m., and for equal results twice the quantity of peat as of f.y.m. would be required. The greatest increase in yield resulted from a 1 : 1 compost of peat and f.y.m., which increased production by 26% at both stations. The value of peat was seen in the course of the 2nd and 3rd years after the first application. Thus the plot receiving 40 tons aerated peat + 40 kg P_2O_5 per ha gave a relative production of 119% the first year and 150% the second year. By applying 40 tons peat per ha the organic-matter content of the soil rose from 4·2% to 5·1%. F. Fr. s. —G.M.R.

765 Taylor, S. A. and Rognerud, B. **Water management for potato production.** *Fm Home Sci.* 1959, **20**, No. 4, 82–4, illus. [Greenville Exp. Fm, Utah]

Bliss Triumph potatoes received various combinations of 2 levels of irrigation treatments during 3 growth periods : (a) planting to beginning of tuber set, (b) setting of tubers, (c) development and maturity of tubers. Plots kept wet throughout the growing season used 11·6 in. of irrigation water in 11 irrigations ; those kept moist in the first 2 periods and dry in the third used 9·8 in. of water in 7 irrigations ; those kept dry throughout the season used 7·1 in. of water in one irrigation. Other combinations of treatments used 8·7 – 11·2 in. of water. Plots kept moist during all 3 periods gave the highest yields. On all plots that were kept moist during the first 2 periods there were more tubers set than on those allowed to become dry during one or both of these periods. If the plots were kept moist during the second period the tubers were larger than if the plots were dry during this period. In general the tubers from plots which were kept dry during the final period had a higher starch percentage than tubers from plots which were kept moist.—A.M.H.

766 Allen, H. P. **Potato shaw [haulm] destruction.** *Fmg Rev.* 1960, No. 15, 14–16, illus. [Plant Protection Ltd., Fernhurst Res. Sta.]

Brief descriptions are given of chemical methods, including the use of sulphuric acid, sodium arsenite, tar-acid emulsion, sodium chlorate, and diquat.—A.G.G.H.

767 Butler, A. J. **Potato haulm destruction and pre-harvest weed control with chemicals.** *Proc. Brit. Weed Contr. Conf. 1958* 1960, **4**, 254–8. [Plant Protection Ltd., Fernhurst Res. Sta.]

In trials on main crop and early potatoes 1 : 1′–ethylene–2 : 2′–dipyridylium dibromide was compared with sodium arsenite and pentachlorophenol (PCP) in vaporizing oil. On main-crop potatoes the new herbicide at 2 lb/ac gave results similar to those obtained with sodium arsenite at 10 lb As_2O_3/ac or with PCP at 3 lb/ac. On early potatoes, using 0·5–2 lb/ac, haulm destruction was less satisfactory, but for seed potatoes, 1·5 lb/ac was suitable. At this dosage the new herbicide gave satisfactory pre-harvest control of the principal weeds of main-crop potatoes. F. s.—D.B.

768 Olofsson, B. Karlringsmissfärgning genom blastdödning. **[Vascular ring discoloration in potatoes through haulm-killing.]** *Växtskyddsnotiser, Stockh.* 1960, **24**, No. 1, 12–15, illus.

Some 25 reports of vascular ring discoloration in potatoes following chemical haulm-killing were received from different parts of Sweden in 1959. In trials laid down at Bergshamra in the same year, most of the preparations in general use for haulm-killing produced this discoloration, especially chemicals having rapid action, such as sulphuric acid. The effect of chlorate and dinoseb was less marked. Spraying was done in two trials on 7 and 8 Sept. and on 16 and 24 Sept., respectively, and the percentage of affected tubers was considerably less after the later of the two applications. A weather diagram for the trial period shows that, while August had been dry, between the early and later sprayings rainfall had occurred, 11 mm in one case and 30 mm in the other, and the temperature at the time of the later sprayings was relatively low. It is believed that under normal conditions the production of such discoloration is extremely rare and that dry conditions, which were marked in 1959, are probably responsible for it. For the present, in pronounced drought, mechanical haulm-killers should be preferred to chemical treatment.—G.M.R.

769 Long, D. H. **Second early potato variety trials 1951-57.** *J. nat. Inst. agric. Bot.* 1959, **8**, No. 3, 630–9, bibl. 2.

The results are reported of 96 trials in Gt Britain with second-early potato varieties during 1951–7. Yields for 2 harvests are tabulated and notes are given on growth, diseases, stem-end blackening after cooking and yield variation between seasons. Only Ulster Dale consistently equalled or outyielded the control, Craigs Royal, in total yield and yield of tubers passing a 2-in. riddle.—S.M.J.

770 Zanotti, L. La coltura della patata oggi. **[Potato-growing to-day.]** *Ital. agric.* 1960, **97**, No. 9, 905–37, illus.

Information is given on potato-growing in Italy, mainly with regard to varieties.—E.B.O.

771 Institut National pour l'Étude Agronomique du Congo Belge. [**Potatoes.**] *Rep. INÉAC 1959* 1960, 386–7, 397–8, 432 and 450–1.

In a trial at the Experimental Station of Keyberg the introduced potato varieties Prinslander and Gineke yielded best and were the most resistant to degeneration. At Kaniama Station in 1958, Sequoia yielded 31,333 kg tubers/ha and was better than other introduced American varieties. The potato varieties Eigenheimer and Sientje are recommended for distribution in south Kivu. At the Experimental Centre of Ndihira, the varieties Libertas, Profijt and Sientje yielded 24,236, 24,665 and 26,635 kg of tubers/ha, respectively, compared with 15,002 kg from the control Eigenheimer.—E.B.O.

772 Dodds, K. S. **The potato at home [in S. America].** *Agriculture, Lond.* 1960, **57**, No. 9, 459–63. [John Innes Inst., Bayfordbury, Herts]

773 Smedgård, G. Fortsatt undersökning över filtsjukan hos potatis (*Rhizoctonia solani*) och möjligheterna att bekämpa densamma under svenska förhållanden. [**Further studies of potato disease caused by *Rhizoctonia solani* and its control under Swedish conditions.**] *K. Skogs LantbrAkad. Tidskr.* 1960, **99**, No. 3–4, 105–20, bibl. 6. [Plönninge Agric. Sch., Harplinge, Sweden]

Studies begun in 1956–7 [*Fld Crop Abstr.* 12 : 1376] were continued in 1958–9. Inventories of scurf-affected tubers made in Götaland, southern Sweden, and in Västerbotten in the north showed the frequency and intensity of the disease caused by *Rh. solani* to be very considerable in Götaland but of little extent in Västerbotten. Further trials in the disinfection of seed potatoes with Hg compounds, PCNB and thiram (50%) were made, thiram proving the most effective. Field trials using thiram directly in the mechanical planter were made in 40 places in the south of Sweden, and resulted in an average increase in yield of 7·7% and a slight diminution in scurf-affected tubers. The longer the tubers remained in the ground after maturity or haulm destruction, the worse was the scurf.—G.M.R.

774 Dinkel, D. H. **A study of factors influencing the development of hollow heart in Irish Cobbler potatoes (*Solanum tuberosum* L.).** *Diss. Abstr.* 1960, **21**, No. 1, 14–15. [Univ. Minnesota, St. Paul]

775 Hansen, F. and Henriksen, J. B. Undersøgelser over såring af kartofler. [**Investigations into the wounding of potato tubers.**] *Tidsskr. Planteavl* 1960, **64**, No. 2, 244–93, bibl. 62, English summary.

In investigations during 1954–7, mainly at Studsgaard, potatoes were damaged by dropping them from a height of 85 cm on to (a) the wires of a grader riddle, (b) a smooth surface or (c) a rough surface; they were stored at 1, 5, 10 or 15°C for 5, 10, 20 or 30 days, and thereafter overwintered at 1°C. Rate of healing depended on the method of injury and was slowest when tubers were dropped on to wires. Tubers given treatment (a) were most susceptible to attack by *Fusarium* spp. Of the potatoes stored at 1°C for the entire period, 12·3% from treatment (a), 95% from (b) and 85·6% from (c) were free from *Fusarium* moulds at the end of the experiment. At 1°C, suberization of the parenchymatous cells was very slow, and even after 160 days no periderm had been formed. After 20 days at 5°C, wound periderm had begun to form. The smallest losses of weight during the storage period occurred in tubers stored for 10–20 days at 15°C, before overwintering at 1°C. The greatest losses of weight occurred among potatoes damaged by wires and then stored at 1°C. In 1956–7 the effect of 10 days' storage at 18–20°C following wounding, and of damage during the storage period, on weight losses during storage at 3, 6 or 9°C was investigated. Undamaged tubers lost 0·7% weight during storage for 10 days at 18–20°C and a further 0·4% each month when stored at 3°C. The loss in weight during storage up to 15 April in undamaged potatoes, stored since 13 Nov. at 6 or 9°C, was almost the same as that in similar tubers stored at 3°C until 15 Dec. or 15 Feb. and then transferred to the higher temperatures. Greater losses in weight occurred during storage at the higher temperatures. The mode of wounding and storage temperature greatly affected loss in weight of the tubers.—S.M.J.

776 Lazarev, I. Z. [**The possibility of indicating the dormant period of potato tubers and the peculiarities of its duration by means of the kinetics of the electrical conductivity of the internal tissues.**] [Russian] *Fiziol. Rast. (Pl. Physiol., USSR)* 1959, **6**, No. 5, 579–84, bibl. 6, English summary. [Kuban Agric. Inst., Krasnodar]

777 Germann, O. Einfluss ein- und mehrmaligen Abkeimens auf Entwicklung und Ertragsfähigkeit der Kartoffelpflanze. [**The effect of removing sprouts once or several times on the development and yield of potatoes.**] *Z. Acker- u. PflBau* 1960, **111**, No. 1, 73–91, bibl. 22, illus., English summary. [Inst. für PflBau u. Saatguterzeugung der Forschungsanst. f. Landwirtschaft, Braunschweig-Völkenrode, German Fed. Rep.]

Tubers of 12 potato varieties were stored from Dec. to May in the dark at 12°C. Sprouts were removed at 4-weekly intervals and the consequences of desprouting were observed as follows: (1) the effect of desprouting on the sprouting ability of tubers of different varieties; (2) the effect of loss of sprouting ability of different varieties, and measures to reduce damage arising from desprouting; (3) the connexion between reduced sprouting energy (as a result of desprouting) and respiration of tubers. To determine the sprouting ability of desprouted tubers the following readings were made after each desprouting: the number of sprouting eyes per tuber; the number of sprouts per tuber; the total weight of sprouts per tuber. The data thus obtained showed that the sprouting ability in very early and early varieties was weakened earlier than in medium-early or late varieties. A chitting period (4 weeks in daylight and a temperature of 12–18°C), inserted between sprout removal and renewed sprouting, improved sprouting ability. This improvement was evident in the reduction in the number of 'blanks' in the field caused by disturbances to growth which followed planting immediately after desprouting. These growth disturbances were caused by *Rhizoctonia* infection or by small-tuber formation on the sprouts. Sprout removal caused yield reductions only if there was a permanent weakening of the tuber. Provided that storage conditions are similar and that the same total weight of sprouts is produced during a given period of time, desprouting 3 times does no more injury than desprouting once. There was a positive correlation between the weight of sprouts (determined in the laboratory) and tuber yield. The reduction in sprouting energy as a result of continued sprout removal was not accompanied by a reduction in respiration rate.—D.B.

778 OWERS, A. C. **Time, temperature and potato sprouts.** *Fmr and Stk-Breed.* 1960, **74**, No. 3705, 82–3, illus.

A description is given of the investigation in progress at the Terrington Experimental Husbandry Farm, Norfolk, to determine the sprouting behaviour of different potato varieties, including Arran Pilot, King Edward and Majestic.—A.G.G.H.

779 AVAKJAN, V. A. [**Degeneration in potatoes.**] [Russian] *Agrobiologija* (*Agrobiology, Moscow*) 1960, No. 6(126), 839–45, bibl. 7, illus. [Timirjazev Agric. Acad., Moscow]

Degeneration in potatoes has been attributed variously to aging of the varieties, ecological "depression", or to virus disease. The author claims that the cause of degeneration is an interruption of the plant's normal metabolism under unfavourable conditions. This study was made on the Lorh potato variety grown in the Šamšadin region of Armenian SSR. There is evidence that, under conditions of the tests, tubers of northern origin (Moscow region) show degeneration in the planting year; when planted in the Armenian lowlands in spring 23% of the plantings degenerated, but the degeneration was only 10% when planted in the foothills in summer. Plants which react positively to virus X gave greater tuber yields, with a protein content 7·5% higher (on dry-wt basis) than those not infected with the virus, while the content of dry matter and starch in degenerate tubers was 9·4% and 10·7% lower, respectively. Tubers with filamentous sprouts contained 10·9 parts protein per 100 parts starch (greater than in healthy plants by 8%) while in plants affected by leaf-curl, virus X or mosaic, the protein per 100 parts starch is greater than in healthy plants by 26 – 35%. Degeneration is therefore considered to be an expression of the interruption of the plant's normal metabolism. It is claimed that seed material from only 1 year's planting in summer produced an increase in tuber yields of 56·6% over the [annual] harvests obtained from several years' planting in spring. Similar results were obtained with ware potatoes.—M.H.

780 MOKRONOSOV, A. T. [**The photoperiodic reaction of the cultivated potato plant.**] [Russian] *Bot. Ž., SSSR* (*Bot. J., USSR*) 1960, **45**, No. 11, 1645–53, bibl. 40, illus. [Ural. State Univ., Sverdlovsk]

In artificially shortened days the potato crop usually does not flower, but tuber initiation is accelerated and tuber growth is enhanced as compared with crops grown in long days. On this basis it has been assumed that development of the potato plant is retarded in short days and the plant has therefore been classified as a long-day type. In the author's view, the loss in the potato plant of the capacity to flower in short days does not signify that short days retard development, because this suppression of flowering may be the result of various factors operative during ontogenesis. In an attempt to determine to which category (long- or short-day) the potato plant belongs, the author studied the growth of *Solanum tuberosum* and *S. demissum* during 1952–9. The data showed that ontogeny progresses more rapidly in the potato plant as a whole when grown in short days. It is concluded that division of the plant into 2 photoperiodic groups (as a short-day type for tuber formation and as a long-day type for flowering) is not justified. The capacity to flower in long days may be regarded as a protective feature to secure reproduction in an environment adverse for tuber formation. On the other hand, many potato plants growing in the high mountains of S. America multiply by both tubers and seeds. If the crop is grown for a lengthy period in high latitudes and long days, profound changes may be induced in the photoperiodic reaction. In the

author's view the acceleration of tuber formation in short days signifies acceleration of development. If short-day plants are those in which flowering and fruiting are accelerated in short day and retarded in long day (see Samygin, *Trudy Timirjazev Inst. Pl. Physiol.* 1946, 3, No. 2), then the potato plant should be regarded as a short-day plant since tuber formation is biologically analogous to seed production.—M.H.

781 WEINDLMAYR, J. Wachstumszonen im Spross verschiedener Kartoffelsorten in Abhängigkeit von der Tageslänge. [**Growth zones in the shoot of different potato varieties in relation to day length.**] *Bodenkultur* 1960, **11**, No. 1, 71–85, bibl. 25, illus. [Inst. PflBau u. PflZücht., Hochsch. Bodenkultur, Wien, Austria]

782 ALVIM, P. de T. Fisiología de la tuberización de la papa. [**Physiology of tuber formation in the potato.**] *Agronomía, Lima* 1960, **27**, No. 1, 19–27, bibl. 19. [Inst. Interamer. Cie. Agríc., Lima, Peru]

This is a review —E B.O

783 RAZUMOV, V. I. [**The significance of gibberellin for tuber formation.**] [Russian] *Bot. Ž., SSSR* (*Bot. J., USSR*) 1960, **45**, No. 7, 939–50, bibl. 6, illus. English summary. [All-Union Inst. Plant Ind., Puškin]

Among the species used in the experiments were *Solanum demissum* and *S. acaule*. The plants were grown in short-day conditions during the whole or part of the vegetative period. The cauline apical bud was sprayed with 0·01% solution of gibberellin either when the plants were in short days or had been transferred to long-day conditions. In the above species grown under short days, gibberellin did not retard tuber formation and did not affect the critical value of the photoperiod. The buds remained dormant after treatment. The number of leaves per plant was increased by the treatment and consequently tuber weight was raised. When the plants were treated after being transferred to long-day conditions, the formation of new leaves was stimulated and the initiation of new tubers inhibited. F. Eng.s. —M.H.

784 CLAVER, F. K. Efectos del ácido giberélico y de la hidrazida maleica sobre la tuberización de la papa. [**Effects of gibberellic acid and maleic hydrazide on tuber formation in the potato.**] *Phyton* 1960, **15**, No. 1, 29–35, bibl. 5, illus., English summary. [Fac. Agron., La Plata, Argentina]

The object of this study was to determine the influence of gibberellic acid and maleic hydrazide on the length of the period of formation of little tubers on leafless potato sprouts which developed on potato tubers kept in the dark. Treatment with maleic hydrazide had no effect. Treatment with gibberellic acid at total doses of 5, 10, 50 and 100 μg, lengthened the period of tuber formation by 15, 18, 26 and 25 days, respectively, and induced secondary tuber growth. This indicates that gibberellic acid favours the formation of potato tubers. F. s.—E.B.O.

785 DEMURJAN, G. S. [**The chemical composition of potato tubers grown near Leninakan.**] [Russian] *Izv. Akad. Nauk Armjansk. SSR* (*Bull. Acad. Sci. Armenian SSR*) 1960, **13**, No. 3, 81–5, bibl. 5. [Exp. Select. Sta. Vegetable Prod., Armenian SSR]

The soils of the Leninakan Plateau [approx. 41°N., 44°E.] are chernozems in which the thickness of the humus layer is between 50–75 cm. This study was made to determine the chemical composition of potato varieties as affected by planting on these soils in spring (16 or 21 May) or in summer (3, 15 or 21 July) and harvested between 5 and 23 Oct. There is evidence that the content of dry matter and of starch in the tubers is generally somewhat higher from spring planting (with the exception of the early ripening var. Epron in which the content of these substances is similar whether planted in spring or summer). Dry matter in the Lorh variety, for example, was 19·9% and 18·2% from spring and summer plantings, respectively, and in Majestic 20·08% and 18·14% respectively. —M.H.

786 LINDNER, K. and others. Aminosäurezusammensetzung und biologischer Wert der Kartoffeleiweiss-Fraktionen. [**Amino acid composition and biological value of potato protein fractions.**] *Qual. Plant. et Materiae veg.* 1960, **7**, No. 3, 289–94, bibl. 13. [Govt. Inst. Nutrition Sci., Budapest, Hungary]

The composition of albumin, tuberin and globulin II protein fractions, obtained from the Hungarian potato variety Ella, is given.—R.B.

787 GEROLA, F. M. and GRILLI, Maria. Contenuto in aminoacidi liberi in tuberi di patata (*Solanum tuberosum* var. Majestic) provenienti da cespi sani e virosati. [**Content of free amino acids in potato (*S. tuberosum* var. Majestic) tubers from healthy and from virus-affected plants.**] *Ann. Fac. Agr., S. Cuore* 1960, **78**, No. 2, 13–28, bibl. 9, illus., English and French summaries. [Ist. Bot. Fac. Agr. Univ. S. Cuore, Piacenza, Italy]

788 ALTEN, F. and others. Stoffwechselphysiologie und Vitalität von Pflanzkartoffeln. [**Metabolism and vitality of seed potatoes.**] *Landw. Forsch.* 1960, Sonderheft 14, 97–107, bibl. 32, illus. [FAL, Braunschweig-Völkenrode ; Tech. Hochsch. München, Weihenstephan ; Landw. Forschungsanst. Büntehof, Hannover, German Fed. Rep.]

Observations were made on the effect of different combinations of mineral fertilizers on the development of a seed-potato crop and on the behaviour of seed tubers during storage and subsequent cultivation. The harvested potatoes were stored from Oct. to April at 1, 4, 7 and 18°C. Storage temperature had a much greater effect than had manurial treatment on the metabolic changes in stored potatoes and on the time of sprouting. At 18°C, 100% of the tubers had sprouted in Dec., at 7°C, 100% by Feb. and at 4°C, 100% by March. Stored at 1°C, the tubers remained dormant for 6 months. Respiration rate was greater at 1°C than at 4 or 7°C. Sprouting of tubers stored at 18, 7 and 4°C began during a period when respiration rate was low. During the 3–6 weeks before sprouting began there was an increase in amylase- and saccharase-activity in the seed tubers. Prolin, absent from freshly harvested tubers, increased during storage, and its concentration reached a maximum before sprouting, after which it fell. Storage temperature exerted a great influence on the vitality of seed tubers and the subsequent crop, but the fertilizer treatment of the seed-potato crop had no such effect.—D.B.

SWEET-POTATOES

789 Waitt, A. W. **Sweet potato trials.** *Rep. Dep. agric. Res., Nigeria 1958-59* 1960, 14.

In a planting trial with sweet potato [*Ipomoea batatas*] variety French Guinea, plants were spaced 18 in. or 12 in. apart on 3-ft ridges and 8 in. apart on 4-ft ridges, to give 9680, 14,520 and 16,335 plants/ac, respectively. Plots were harvested 120, 140 and 160 days after planting. A growing period of at least 160 days and spacing of 8 in. on 4-ft ridges are recommended as a result of the experiment.—S.M.J.

790 Institut National pour l'Étude Agronomique du Congo Belge. [**Sweet-potatoes.**] *Rep. INÉAC 1959* 1960, 460, 492 and 512.

At Nioka Station the sweet-potato varieties Virovsky 16, 5383 and Mugenda yielded satisfactorily (29,970, 26,640 and 19,980 kg fresh roots/ha, respectively). The variety Caroline Lee is being distributed in the Ruanda-Urundi. At Kisozi Station the varieties Norton Sam 346 and Mugenda 3089 yielded 31,300 kg and 33,040 kg fresh roots/ha when grown in hills, and 34,600 kg and 41,900 kg when grown on flat ground, respectively, after 360 days of vegetation. These 2 varieties have been released to farmers.—E.B.O.

791 David, A. L. **Insecticidal trials for the control of the sweet potato weevil.** *Madras agric. J.* 1960, **47**, No. 6, 247–51.

Infestations of *Cylas formicarius* on *Ipomoea batatas* were reduced and crop yields were increased by treatment with dieldrin or DDT. Treatment was given by dipping sweet-potato slips in the insecticide for 5 min just before planting, or by spraying the leaves, or by applying insecticide to the soil. Leaf spraying and soil treatment were most effective when applied during the tuber-formation period.—D.B.

CASSAVA

792 Beck, B. D. A. **Cassava trials on Moor Plantation.** *Rep. Dep. agric. Res., Nigeria 1958-59* 1960, 11.

In an investigation into the effect of length of growing period on yield, cassava was harvested at 3-monthly intervals for 21 months. After the first 6 months' growth, no further tubers were formed. Thus the significant increases in yield obtained with increased length of growing period were due to development of the tubers formed in the first 6 months of growth and not to the continuous formation of new tubers. Variety 53101 matured most rapidly and after 9 months' growth gave a significantly greater yield than the other varieties in the trial, but at 21 months there was no difference in yield (about 21 tons/ac).—S.M.J.

793 Institut National pour l'Étude Agronomique du Congo Belge. [**Cassava.**] *Rep. INÉAC 1959* 1960, 311, 365, 375, 431, 480, 492 and 515–16.

The yields of many cassava varieties at various stations are given. In the Kivu, the cassava variety Amer-de-6-mois is suitable for growing at a low altitude, and Ntolili at above 1400 m ; the results from 2 trials at 1150 and 1500 m showed an advantage from harvesting cassava from the 18th to the 24th month of growth. At Rubona Station, the cassava variety Eala Amer was multiplied in a groundnut crop. At Muyovozi, the variety Criolinha was cut back when 10 months old and yielded 31,000–58,000 kg fresh roots/ha when 20 months old.—E.B.O.

YAMS

794 Gooding, H. J. **West Indian '*Dioscorea alata*' cultivars.** *Trop. Agric. Trin.* 1960, **37**, No. 1, 11–30, bibl. 19, illus. [Fac. Agric., Univ. W. Indies]

Sixteen West Indian cultivars of *Dioscorea alata* are distinguished and described, and a key for their identification based primarily on leaf character is given. In a yam storage trial in 1958, the variation in the loss of weight of one cultivar of *D. esculenta* and 7 of *D. alata* was investigated. Loss of weight during storage was greatest in the pigmented *D. alata* cultivars and lowest in non-pigmented ones.—S.M.J.

795 Waitt, A. W. **Yam trials.** *Rep. Dep. agric. Res., Nigeria 1958-59* 1960, 13–14.

In 1958, varietal trials were carried out with 14 varieties of white yam (*Dioscorea rotundata*) and 7 each of water yam (*D. alata*) and yellow yam (*D. cayensis*). Low yields [not given] were attributed to early rains followed by a long dry spell. The best local variety was the highest yielding among the white yams, and the best yellow- and water-yam varieties were from the Eastern and Northern Regions, respectively. In a sprouting trial tubers of white yam were cut into planting setts of normal size and placed in pits : (a) unmulched, (b) mulched after replacement of the soil; alternatively, (c) tubers were stored in a barn. In March, setts from treatments (a) and (b) were planted at the same time as setts cut from whole tubers in treatment (c). Treatments (a) and (b) resulted in higher sprout counts than (c), but at harvest, yields indicated that normal storage of tubers (c) was superior to the storage of setts in a pit covered with mulch but not to the storage of setts in a pit without mulch. The lower yield from (b) compared with (c), following a higher sprout count in (b) was due to the longer sprouts on (b) which became damaged in bad weather. In a staking trial, 10-ft staking compared with the normal 6-ft staking, resulted in higher yields with *D. alata* only. In a growth trial in 1957, average fresh weight of the vines of *D. alata*, *D. dumetorum* (cluster yam), *D. cayensis* and *D. rotundata* increased with increased rainfall but with a time lag which varied with the species. In dormancy-breaking experiments using 8 chemicals [6 not named] sodium thiocyanate and GA gave slightly higher increases in total germination of yam than did the other 6. In dry-matter and moisture-content determinations *D. cayensis* gave the highest mean dry-matter content, followed by *D. rotundata*, then *D. alata*.—S.M.J.

COCOYAMS

796 Jonker-Verhoef, A. M. E. and Jonker, F. P. **Notes on the Araceae of Suriname. 2.** *Med. bot. Mus. Rijksuniv. Utrecht* 1959, No. 154, 139–55, illus.

Information is given on *Colocasia esculenta*, *Xanthosoma* spp. and *Alocasia* spp., all of which are cultivated in Surinam.—E.B.O.

797 Portères, R. La sombre Aroidée cultivée : *Colocasia antiquorum* Schott ou taro de Polynésie. Essai d'étymologie sémantique. [**The dark cultivated species of Araceae : cocoyam (*C. antiquorum*). An essay on semantic etymology.**] *J. Agric. trop. et Bot. appl.* 1960, **7**, No. 4–5, 169–92, bibl. 110.

The cultivated edible cocoyams are grouped under *Colocasia antiquorum* var. *esculenta*. All the local names given to *C. antiquorum* in Asia, the Pacific Islands and Madagascar refer to the black or bluish-black colour of its tubers and the dark colour of its leaves.—E.B.O.

JERUSALEM ARTICHOKE

798 Hanower, P. Formation et débourrement de nouveaux tubercules axillaires sur les tubercules mères de topinambour et phénomènes accompagnant les degrés de levée de dormance de ces plantes. [**Formation and development of new axillary tubers on the mother-tubers of Jerusalem artichoke, and phenomena accompanying the degree of dormancy removal in these plants.**] *C.R. Acad. Sci., Paris* 1960, **251**, No. 23, 2767–9, bibl. 3, illus.

The tubers of Jerusalem artichoke harvested in November are dormant. A partial breaking of dormancy was obtained by keeping tubers of the variety Patate Vilmorin in moist sand or earth at about 18°C for 3 weeks. This treatment resulted in the formation of short sprouts which soon formed tubers. The secondary dormancy of these new tubers could be broken partially by various treatments.—E.B.O.

OXALIS TUBEROSA

799 Orbegoso, A. G. Estudio sobre la oca (*Oxalis tuberosa* Mol.) con especial referencia a su estructura y variabilidad. [**Study of *Oxalis tuberosa* with special regard to its structure and variability.**] *Agronomía, Lima* 1960, **27**, No. 1, 28–38, illus. [Inst. Interamer. Cie. Agríc., Turrialba, Costa Rica]

Information, including history, morphology and anatomy, is given on this plant, grown for its edible tubers in the Andes of Peru and Bolivia. The crop has not been studied in detail, but appears to be promising for many countries of S. America, where, because of its nutritive value, it could compete with potatoes. The optimal daylength for tuber formation in *O. tuberosa* is 9 hr, while 13 hr are suitable for its vegetative development. Under short days the stolons penetrate into the soil and form tubers ; under long days they seek the light and grow into above-ground stems. The tubers are white, yellow or red. [See also *Fld Crop Abstr.* 9 : 525.]—E.B.O.

FIBRE CROPS

COTTON

800 Pereira, J. R. Algodão de fibra longa. [**Long-fibre cotton.**] *Mem. Trab. 36 Cent. Invest. cient. algod.* 1959, pp. 30, illus. [Esta. Exp. Onga-Zanga, Catete, Luanda, Angola]

This publication, based on studies and trials with long-fibre cotton at the above station, gives information on the variety Giza 7 (*Gossypium barbadense*), on cultural methods, and the economics of this crop.—E.B.O.

801 Institut National pour l'Étude Agronomique du Congo Belge. [**Cotton.**] *Rep. INÉAC 1959* 1960, 307–8, 310, 587–8, 591 and 597.

In the northern cotton region of the Congo the variety under multiplication is Bambesa 49 ; in the southern region C 2, a new variety, will probably soon be replaced by NC 8 ; the new variety recommended for the eastern region is 1021. At Boketa Station cotton sown in early July yielded considerably more than cotton sown in early Aug. At Lubarika Station, a spacing trial with the cotton variety 1021 showed that the highest plant densities 1·0 × 0·30 m gave the highest yield. Information is given on pest control. Investigations were carried out to study B deficiency and the optimal ionic equilibrium for growth and production of cotton.—E.B.O.

802 Olteanu, Florica and others. Studiul în complex al cîtorva măsuri agrotehnice la bumbac. [**Complex study of cultural measures in cotton-growing.**] *Anal. Inst. Cercetări agron.* 1959/60, **27**, Ser. B. 43–61, bibl. 8, French and Russian summaries.

Yield and ripening in the cotton plant were studied in cultivation trials at 5 Romanian agricultural experiment stations from 1953 to 1956, and the following conclusions were reached. The most influential factor at all the stations and in every year was the date of sowing. Sowing was done when the soil temperature was 10°C at 5 cm depth, 9°C at 30 cm depth, and the air temperature 11°C with a tendency to rise. These conditions were realized about 20 April at 3 of the stations, about 25 April at another, and in the least favourable zone between 1 and 10 May. The second most influential factor was sowing distance between rows, the optimal ranging from 50 to 65 cm between rows according to location and weather. At 4 of the stations a planting density of 120 – 140 thousand plants/ha resulted in increased yield and accelerated ripening ; at another, a density of 100 – 120 thousand plants/ha gave better results. On the basis of the foregoing findings the optimal technique for each of the 5 stations is outlined. F. Fr. s. —G.M.R.

803 Jackson, J. E. and Faulkner, R. C. **Effect of date of sowing, nitrogen and phosphorus on cotton quality and yield.** *Progr. Reps Exp. Stas Emp. Cott. Gr. Corp. Republ. Sudan 1959-60* 1960, 14–20.

Cotton quality and yield were investigated under the following treatments : (1) sowing on 26 July, 25 Aug., 2 and 9 Sept. ; and (2) fertilizer treatments as follows : (a) no N ; (b) urea applied at 80 rotls N/feddan [1 feddan = 1·038 ac, 1 rotl = 0·99 lb] ; (c) superphosphate at 80 rotls P_2O_5/feddan ; (d) urea + superphosphate at the rates given in (b) and (c). Sowing on 26 July resulted in the highest yields (1436 and 2473 lb seed cotton/ac) under the (c) and (d) treatments, respectively, but yields were not significantly different from the 2nd date within treatment (b) or from the 2nd and 3rd dates within the control (a). At all sowing dates the yield was increased by applications of N but was not affected by applications of P. Treatment (d) was significantly better than treatments (a)and (c) at all sowing dates. The average crop quality was improved by earlier sowing.—S.M.J.

804 Ciobanu, I. and Vasiliu, A. Contributii la stabilirea dozelor şi epocilor de aplicare a îngrăsămintelor la bumbac. [**The best rates of application and times to apply fertilizers to cotton.**] *Anal. Inst. Cercetări agron.* 1958–59, **26**, Ser. A, 109–20, bibl. 14, Russian and French summaries. [Romania]

In trials made during 1954–7 the following increases in yield (in kg seed-cotton per ha) were obtained from different manurial treatments : from 20 tons f.y.m. per ha, 117 or 10% ; from the same + 40 kg N, 30 kg P_2O_5 and 20 kg K_2O per ha, 255 or 22% ; from 40 kg N per ha, applied after the basic manuring and when the cotton plants had 3 leaves, 218 or 17% ; from the same + 20 kg P_2O_5 and 20 kg K_2O per ha, the P and K applied at the time of flowering, 290 or 23%. Applying N at the time of flowering reduced yield. Applying mineral fertilizers, namely 45 kg N, 25 kg P_2O_5 and 25 kg K_2O per ha, at different phases of crop growth, gave an increase of 208 or 15%, compared with 165 or 12% when these same doses were applied as basic manures in autumn and spring. None of the fertilizers retarded ripening ; on the contrary, superphosphate, applied to the rows at sowing, accelerated it by 1 to 6 days. F. Fr.s.—G.M.R.

805 Aguirre, A. R. Fertilización nitrogenada del algodón. Efecto de iones secundarios en diversos abonos. [**N manuring of cotton. Effect of secondary ions in various fertilizers.**] *3° Simp. internaz. di Agrochimica Probl. dell'Azoto in Agric., Sevilla, 1960* pp. 15, bibl. 13, English summary.

Recommendations on fertilizers are concerned usually with NPK only. A maximum fertilizer effect can be obtained only by taking into consideration all secondary ions as well as the principal nutrients. Results from long-term trials in the USA on this question are discussed. F. s.—E.B.O.

806† Golovčenko, S. G. [***Trigonella foenum graecum* as green manure for cotton crops.**] [Russian] *Hlopkovodstvo* (*Cott. Prod.*) 1960,

10, No. 9, 27–32, illus. [Bot. Inst., Acad. Sci. Uzbek SSR]

This plant is an annual which completes its growth cycle in 65–80 days. Under normal conditions it flowers in 12–20 days after seedling emergence, and fruits in 30–35 days, seed yield being 1000–1200 kg/ha. During 1947–1959 in the Taškent and Fergana Provinces various experiments were made on the use of this crop, with special regard to green manure for cotton. The data show that under the cultural treatments described, *Trigonella* green manure had beneficial effects on cotton. From one test (with 4 replications) total cotton yield (kg/ha) was 3040 (with green manuring) compared with 1950 (control). There is also evidence that the cotton crop is improved whether the green-manure crop is sown in spring or autumn, and that wilt disease is absent from cotton grown after the manuring.—M.H.

807 Hastie, M. S. **Treatment of partially waterlogged land.** *Progr. Reps Exp. Stas Emp. Cott. Gr. Corp., Kenya 1958-59* 2–3. [Kibos, Nyanza Province, Kenya]

The application of 2 types of mulch (maize stover and grass, and rice husks), with and without the addition of 1 cwt sulphate of ammonia/ac applied 4 weeks after sowing cotton, was investigated on areas of the Kano Plain which become partially waterlogged each year during the rainy season. A mulch of rice husks increased cotton yields significantly over all other treatments. This mulch persisted throughout the season since the husks were resistant to termites. The addition of N to the mulches of rice husks, or maize stover and grass, led to a significant decrease in yield in both cases.—S.M.J.

808 Bar'etas, P. K. **[Alternate-furrow irrigation of cotton crops on saline soils.]** [Russian] *Hlopkovodstvo* (*Cott. Prod.*) 1961, **11**, No. 1, 30–2. [Inst. Genet. and Pl. Physiol., Acad. Sci. Uzbek SSR]

This method of irrigating cotton is extremely effective on grey earths and meadow soils since it accelerates ripening of the bolls and increases the harvest. For saline soils, however, it is not recommended because there is evidence that, in addition to inducing an accumulation of deleterious salts in the soil layer inhabited by the roots, the method subjects the plants to a certain amount of drying which accelerates opening of the bolls and augments the yield of the first harvest, but the total harvest of cotton is lowered.—M.H.

809 Holstun, J. T., Jr and others. **Weed control practices, labor requirements and costs in cotton production.** *Weeds* 1960, **8**, No. 2, 232–43, bibl. 8. [Agric. Res. Serv. USDA, Stoneville, Mississippi]

Sixteen weed-control practices, involving combinations of hand hoeing, a pre-emergence herbicide, post-emergence oil sprays and flame treatments were applied to cotton sown at intervals of 14–23 in. in the row or drilled in rows and cross-cultivated. The direct cost of controlling annual weeds (*Amaranthus*, *Brachiaria*, *Ipomoea purpurea*, *Digitaria sanguinalis*) by hand hoeing and cultivation ranged from $8 to $26/ac. Hand hoeing required 14–53 man-hours/ac. With some combinations of treatments, hoeing proved unnecessary, but simpler combinations of treatments involving some hand labour were often less expensive. F. s.—R.B.

810 Weaver, J. B., Jr and Hauser, E. W. **Response of cotton varieties to pre-emergence CIPC on Piedmont soil.** *Agron. J.* 1960, **52**, No. 7, 409, bibl. 2. [Univ. Georgia Exp. Sta., Athens]

Plots of cotton, vars. Austin, Z106, SUD37, Pope, Coker 100W, SUD43, M8949, Pima S-1, Brazos, Plains and Empire were treated in 1957 and 1958, before seedling emergence, with CIPC at 12 or 24 lb/ac. The herbicide reduced percentage germination, especially when used at the higher rate. There was no significant interaction between variety and herbicide. The higher rate of CIPC tended to reduce stands of Austin, Empire and Coker 100W. In 1958, when plots were thinned and the plants grown to maturity, CIPC did not reduce total yields.—R.B.

811 Holstun, J. T. Jr and Bingham, S. W. **Several triazines as selective post-emergence herbicides in cotton.** *Weeds* 1960, **8**, No. 2, 187–97, bibl. 23. [Crops Res. Div. USDA and Mississippi Agric. Exp. Sta., Stoneville]

The following herbicides were applied at various rates as post-emergence weed control treatments for cotton : CDT, simazin, methoxy simazin, trietazine, propazine, ipazine (2-chloro-4-diethylamino-6-isopropylamino-*s*-triazine) and G-30451 (2-chloro-4-*n*-propylamino-6-isopropylamino-*s*-triazine). Ipazine was the most selective on young cotton (3 or 6 in. tall) and was effective at 2 lb/ac. CDT and trietazine were less selective than ipazine and were the least herbicidally active. The other herbicides were not sufficiently selective for use on young cotton but showed promise on older cotton (12 in. tall). Simazin controlled weeds for the greatest length of time and had the highest residual activity. High rates of CDT, ipazine and methoxy simazin in oil, but not in water plus surfactant, significantly reduced cotton yields where the crop had been treated with diuron before seedling emergence. F. s.—R.B.

812 Harris, J. M. and others. **Dicryl, a new selective post-emergent herbicide for cotton.** *Proc. S. Weed Conf.* [*USA*] 1960, **13**, 235–41.

Dicryl, N-(3,4-dichlorophenyl) methacrylamide, gave excellent control of broadleaved weeds and grasses when applied at 3 lb active ingredient/ac. Dicryl may be safely applied over the cotton plant, but for the best grass coverage semi-directed sprays are recommended. Spraying when the cotton is more than 7 days old and before the weeds are 12 days old is recommended. Rainfall 1 hr after treatment with dicryl did not affect the response to herbicide. F. s.—A.M.H.

813 Lagière, R. and Cognée, M. Les traitements fongicides et bactéricides des semences du cotonnier en République Centrafricaine. Nouvelle contribution. [**Fungicidal and bactericidal treatments of cotton seeds in the Central-African Republic. A new contribution.**] *Cot. et Fibr. trop.* 1960, **15**, No. 1, 41–67, bibl. 21, English summary. [Bambari Sta.]

In trials over several years more than 20 fungicides were tested as cotton-seed disinfectants ; they were used as dusts or liquids, or by the slurry method. Their fungicidal effect before and after emergence, and their bactericidal effect against *Xanthomonas malvacearum* were investigated. Disinfection of cotton seeds resulted in 25% more seedlings 30 days after sowing (average of 67 results), and in a 10% increase in yield of seed-cotton (average of 61 results). Treatment with one of the following organo-mercury preparations is recommended : granopera dust (used at 0·3–0·5%) ; agrosan 5 W by the slurry method (at 0·3%) ; and panogen 0·8% liquid (at 6–11 ml). [See also *Fld Crop Abstr.* 7 : 962].—E.B.O.

814 Logan, C. **An estimate of the effect of seed treatments in reducing cotton crop losses caused by *Xanthomonas malvacearum* (E. F. Smith) Dowson, in Uganda.** *Emp. Cott. Gr. Rev.* 1960, **37**, No. 4, 241–55, bibl. 16. [Emp. Cott. Gr. Corp., Namulonge, Uganda]

In large-scale trials at 3 centres in the 1959–60 season, using 1-acre plots separated by 10-ft strips of elephant grass to prevent the spread of infection, agrosan 5W (5% Hg) seed dressing applied at 1 : 150 w/w was more effective than perecot 45 (cuprous oxide) applied at 1 : 250 w/w in reducing primary infection by bacterial blight. There was no difference in yield between the 2 treatments. It was confirmed that the stem phase of the disease had the greatest effect on yield. In a second experiment the application of perecot 45 reduced the loss of yield from the disease from 20% to 12%. Compensation for early crop loss (due to stem lesions) by later crop production, where environment permits, and interrelationships between bacterial blight, insect damage, and water stress are discussed.—J.D.J.

815 Tarr, S. A. J. **Seed treatment against blackarm disease of cotton in the Sudan. 5. Results with seed carrying light and moderate infection.** *Emp. Cott. Gr. Rev.* 1961, **38**, No. 1, 30–5, bibl. 5. [Bot. Dep., Univ. Exeter]

In the Sudan Gezira a short-wet treatment of moderately infected cotton seed with MEMA (methoxyethylmercuriacetate) gave better control of seed-borne blackarm disease (*Xanthomonas malvacearum*) than mercuric chloride-iodide powder treatment. Emergence of the cotton improved, the crop matured earlier, the incidence of disease was reduced and the yield of seed cotton increased by 0·7 kantars/feddan (1 kantar = 312 lb, 1 feddan = 1·038 ac). However, a residual infection of about 0·017% resulted in a crop loss of about 0·7 kantars/feddan. F. s.—S.M.J.

816 Toms, A. M. **Trials in the Sudan of cotton seed dressing containing insecticides.** *Emp. Cott. Gr. Rev.* 1961, **38**, No. 1, 36–41, bibl. 6, illus. [Sudan Gezira Board, Barakat, Republ. Sudan]

During 1959–60 the effect was compared of abavit B (mercuric chloride + mercuric iodide) and abavit B + 60% a.i. dieldrin applied as a seed dressing (12 oz per 100 lb seed) to control *Podagrica puncticollis* and *Odontotermes* on cotton. The combined dressing resulted in a yield increase of 0·72 kantar/feddan (1 kantar = 312 lb, 1 feddan = 1·038 ac) compared with the single dressing. In a second trial in which the treatments were repeated using 40% a.i aldrin instead of dieldrin the combined treatment again resulted in an increased yield compared with the single abavit B dressing and it controlled *Odontotermes* and *Podagrica puncticollis*.—S.M.J.

817 Suplicy, N. and Fadigas, M. Combate ao ácaro branco do algodoeiro com produtos não sistêmicos. [**Control of *Hemitarsonemus latus* on cotton with non-systemic preparations.**] *Biológico, S. Paulo* 1960, **26**, No. 9, 177–8, bibl. 2.

In trials in Campinas, Brazil, thiovit 50% wettable powder at 6 kg per alqueire [= 24,200 m²] controlled satisfactorily the white mite (*Hemitarsonemus latus*) on cotton, and had a short residual effect.—E.B.O.

818 Davidson, A. [**Optimum yields of cotton under insect-free conditions.**] *Progr. Reps Exp. Stas Emp. Cott. Gr. Corp., Kenya 1958-59* 1960, 7. [Luo-Suba (Lake Shore) Zone, Kenya]

In a yield assessment trial at Kibos, cotton bolls from selected plots were scored on the number of clean loculi. Five-loculi bolls, which formed 12% of the total harvest, showed more insect damage than 4-loculi bolls, both in number of bolls and loculi damaged. This difference was greatest in first and second pickings.—S.M.J.

819 Abdinbekova, A. A. **[The effect of boron, manganese and copper on the resistance of cotton crops to *Aphis gossypii*.]** *Doklady Akad. Nauk Azerbaĭdžansk. SSR* (*Proc. Acad. Sci. Azerbaĭdžan SSR*) 1960, **16**, No. 3, 299–302, bibl. 11, Russian summary.

From tests made during 2 summers (1954 and 1955) it was concluded that spraying cotton plants with solutions of Mn or B salts (preferable to Cu salts) gave effective control of the aphids by increasing crop resistance. Infestation was completely cured after the 4th treatment [rates not given in Russian summary]. F. Russ. s.—M.H.

820 Kabulov, D. T. and others. **[The effect of radioactive isotopes on growth, development and yield of cotton crops.]** [Russian] *Hlopkovodstvo* (*Cott. Prod.*) 1960, **10**, No. 8, 48–51, bibl. 4, illus. [Uzbek State Univ.]

From tests with pre-sowing treatment of cotton seed with ^{60}Co there is evidence of a stimulating effect, not only in an acceleration of vegetative growth, but also in the rate of passing developmental phases, thereby resulting in some augmentation in number and weight of the bolls. Verifications of dose rate (400–800 roentgens) and time of the irradiation are necessary.—M.H.

821 Dransfield, M. **Some effects of gibberellic acid on cotton.** *Emp. Cott. Gr. Rev.* 1961, **38**, No. 1, 3–16, bibl. 19. [Emp. Cott. Gr. Corp., Min. Agric. Res. Sta., Samaru, N. Nigeria]

GA applied to cotton seed did not affect dormancy breaking; it occasionally damaged seeds, resulted in cell elongation in the hypocotyls, and increased seedling height, cotyledon and leaf length and susceptibility to bacterial blight [*Xanthomonas malvacearum*]. When GA was applied as a spray of 0, 1, 10, 25, 50 and 100 ppm. to 8- to 43-day-old cotton seedlings similar responses were obtained, plus increases in the length of the lower internodes, in fresh weight of aerial parts and in rate of flower initiation, but root weight, stem diameter and the length of upper internodes were reduced. Spraying of 3-month-old plants delayed boll shedding. Treatment of bolls, just after fall of the corolla, with 0·2 ml GA solution increased their retention but did not affect yield or lint characters. It was concluded that GA is of no practical benefit to cotton in Northern Nigeria.—S.M.J.

822 Agakišiev, D. **[The effect of biologically active substances on cotton crops.]** [Russian] *Izv. Akad. Nauk Turkmen. SSR* (*Bull. Acad. Sci. Turkmenian SSR Ser. Biol. Sci.*) 1960, No. 4, 75–8, bibl. 9, illus. [Bot. Inst., Acad. Sci. Turkmenian SSR, Ašhabad]

There is evidence that, under conditions of the test, soaking of cotton seed in 2,4,5-trichlorophenoxyacetic acid or 2,4-dichlorophenoxyacetic acid (both at 10 mg/l) before sowing stimulates growth and fruiting, notably at a late stage of crop growth. This stimulation is enhanced if the above substances are mixed with vitamin B_1.—M.H.

823 Bingham, S. W. and Porter, W. K., Jr. **Cotton. 1. The influence of N-(3,4-dichlorophenyl) methacrylamide on early growth and development. 2. The activity of certain enzymes from [cotton] plants treated in the cotyledon stage with N-(3,4-dichlorophenyl) methacrylamide** [Abstract]. *Proc. S. Weed Conf.* [*USA*] 1960, **13**, 214–16. [Louisiana State Univ., Baton Rouge, USA]

Treatment with dicryl, N-(3,4-dichlorophenyl) methacrylamide, markedly reduced the rate of cotyledon development and internode elongation in cotton plants grown in a glasshouse. True leaf expansion was temporarily suppressed. Cell enlargement appeared to be uniformly suppressed without observable malformation of the tissues. Treated cotyledonary material contained more N per unit fresh weight than untreated material. In true leaves, suppression of N accumulation was proportional to the reduction in growth. Maximum stimulation of elongation of hypocotyl sections with IAA was suppressed by an equal weight concentration of dicryl. Both IAA and dicryl reduced elongation of intact roots. Dicryl appeared to suppress growth without any substantial effect on total respiration. Suppression of ascorbic oxidase activity was approximately proportional to the effect on growth. —A.M.H.

824 Mathur, S. N. **Influence of certain growth substances on cotton plant. 1. Effect of β-naphthoxy acetic acid on boll-retention in *Gossypium arboreum* var. 35/1.** *J. Indian bot. Soc.* 1959, **38**, No. 2, 233–8, bibl. 8. [Dep. Bot. Meerut Coll., India] [Seen Jan., 1961]

Plants of *G. arboreum* var. 35/1 were sprayed with an aqueous solution of β-naphthoxy acetic acid at 20 ppm. in alternate weeks starting at the 4-leaf stage. Weekly observations were made on vegetative and reproductive characters for 20 weeks. The treated plants developed more fertile branches and retained more bolls than the controls. F. s.—E.B.O.

825 Herrero, F. A. and Hall, W. C. **General effects of ethylene on enzyme systems in the cotton leaf.** *Physiol. Plant.* 1960, **13**, No. 4, 736–50, bibl. 52. [Dep. Plant Physiol. and Path., Texas A. and M. Coll., College Station]

826 Mello, F. A. F. de and others. A diagnose foliar do algodoeiro (*Gossypium hirsutum* L., var. I.A.C. 817) no Brasil. **[Foliar diagnosis in cotton (*Gossypium hirsutum*, var. I. A. C. 817) in Brazil.]** *Agros, Lisboa* 1960, **43**, No. 4, 233–9, bibl. 15, English and French summaries. [Esc. Sup. Agric. L. de Queiroz, São Paulo, Brazil]

A review is given of results from studies on foliar diagnosis in cotton with a view to the correct manuring of this crop. The studies were inconclusive. It is thought that the possibility of early sampling of leaves, e.g. 45 days from sowing the crop, should be investigated. This would allow a grower to correct the mineral deficiencies in the same season. —E.B.O.

827 Nelson, R. F. **An investigation of a chemical mechanism of foliar abscission [in cotton].** *Diss. Abstr.* 1960, **20,** No. 12, 4502. [Iowa State Univ., Ames]

828 Cámara, H. J. La presencia de *Gossypium peruvianum* var. *brasiliense* en Argentina. [**The presence of *G. peruvianum* var. *brasiliense* in Argentina.**] *Rev. argent. Agron.* 1960, **27,** No. 1–2, 1–8, bibl. 9, illus. [Lab. Bot., Fac. Agron. y Veter., Buenos Aires]

A description is given of *G. peruvianum* (= *G. barbadense*) var. *brasiliense* which is grown on small holdings in Orán, Salta province.—E.B.O.

829 Saunders, J. H. **The wild species of *Gossypium*. 4. World distribution and evolutionary history.** *Emp. Cott. Gr. Rev.* 1960, **37,** No. 4, 258–65, bibl. 7, illus. [Dep. Agric., Uganda]

830 Raskopf, B. D. **Cotton yields and quality in Tennessee.** *Bull. 298 Tennessee agric. Exp. Sta.* 1959, pp. 26.

Cotton acreage in Tennessee rose from under half a million in 1871 to over a million in 1925, and fell again to under half a million in 1958. Loss of acreage in the latter period has been made good by increased yields and better prices attributable to better quality. This bulletin describes trends in yield and quality during the 31 years from 1928 to '58. There has been no definite trend in grade, but 1-in. staple or better is now general instead of rare, and rough ginning has been almost eliminated. Data are given for fibre and yarn performances in tests for 12 specified characters.—J.D.J.

831 Quintanilha, A. Viagem de estudo aos Estados Unidos e ao Canadá. [**Study tour in the USA and Canada.**] *Mem. Trab. 37 Cent. Invest. cient. algod.* 1959, pp. 109, illus. [Lourenço Marques, Mozambique]

This is concerned mainly with cotton cultivation and research in the USA.—E.B.O.

FIBRE FLAX

832 Kugler, W. F. **Flax production in Argentina and its problems.** *Fibra* 1960, **5,** No. 3, 88–99, bibl. in text. [Pergamino Agric. Exp. Sta., Argentina]

This article is concerned with acreage, yield, production and varieties of oil-seed flax, fibre flax and dual-purpose flax in Argentina.—E.B.O.

833 Larsen, A. Gødnings- og kalkningsforsøg med spindhør. [**Fertilizer and liming experiments with fibre flax.**] *Tidsskr. Planteavl* 1960, **64,** No. 1, 102–48, bibl. 20, English summary. [Stat. Forsøgsvirk. Plkult., Aarslev]

During 1952–7 the effect of increasing quantities of fertilizers to fibre flax were investigated at 4 locations in Denmark. 0, 150 and 300 kg calcium nitrate, 0, 250 and 500 kg superphosphate and 0, 200, 400 and 600 kg potassium sulphate were applied per ha in all combinations. On average, germination was not affected by the type or quantity of fertilizer used. The natural loss in stand density between germination and harvest was unaffected by superphosphate, but was increased from 1·8 to 3·5% by the addition of 300 kg calcium nitrate and decreased by increasing applications of K. Yields of raw flax, straw, seed and scutching tow were increased by applications of up to 300 kg calcium nitrate per ha but the yield of scutching flax was highest at the 150 kg/ha level, since higher applications reduced the fibre content and resulted in more lodging. It is suggested that where fibre flax follows a normally manured cereal crop, up to 150 kg calcium nitrate should be applied per ha. The application of K increased the yield of scutching flax.—S.M.J.

834 Szatala, Ö. Vegyszeres gyomirtási kíserletek rostés olajlen vetésekben. [**Experiments in the chemical control of weeds in fibre- and oil-flax.**] *Kisérl. Közl.* 1959, **52 A,** No. 4, 111–46, bibl. 113, illus., Russian and German summaries. [Res. Inst. Plant Prot., Budapest]

Trials were made from 1955 to 1957 to test 7 Hungarian and 8 foreign preparations based on DNOC, DNBP and MCPA. The trial plants were Beta oil flax and Concurrent fibre flax. Spraying was done once or twice when the plants had attained heights of 4–6, 8–12, 15 and 20 cm. They were resistant to DNOC and DNBP when 4 to 15 cm and to MCPA when 8 to 15 cm high. The best time for spraying was when the flax was 8 to 12 cm high. The Hungarian Krezonite F paste (DNOC-Na) effected good destruction of annual and less resistant weed species. The Hungarian Nikrezil paste, based on MCPA, was satisfactory in destroying perennial and more resistant weeds, while similar good results were obtained from the mixture Nikrezil paste + Krezonite M. This last-named mixture also prevented the incidence of resistant weed mutants. Positive or negative results depended upon concentration and the time of spraying. Spraying too early (4–6 cm height), too late (20–22 cm), and twice had a detrimental effect on seed- and oil-yield, germination capacity, 1000-grain weight, stem length and fibre yield and

quality, and also produced symptoms of physiological disturbance. Under optimal conditions, however, the use of the weedkillers had a tendency to stimulate flax. No significant difference was perceptible between oil- and fibre-flax in sensitivity to the weedkillers, although the tolerance of oil flax towards MCPA products was about 10 to 20% higher than in fibre flax. Weather is important ; too high air relative humidity is as unfavourable as a period of drought. Optimum temperature is 18–25°C. At lower temperatures the effect of the weedkillers is reduced or disappears, at higher temperatures phytotoxic effects result. After spraying, a rain-free period of at least 4–6 hours is desirable. F. Ger. s.—G.M.R.

835 Larsen, A. **Experiments on the net assimilation rate of flax (*Linum usitatissimum*).** *Acta Agric. scand.* 1960, **10**, No. 2–3, 226–36, bibl. 11. [Stat. Forsøgsta., Aarslev, Denmark]

During 1958–9 the leaf development of flax was studied at Aarslev under different water regimes. Flax grown in pot cultures was watered to 20, 30, 45, 65 and 90% of field capacity or subjected to periods of drought. In both years, leaf area increased steadily in proportion to the amount of available water. The assimilation capacity of the leaf system per unit of area and time was independent of the size of total leaf area between leaf-area indices of 2–7, and of the available water supply. An equation is given from which the net-assimilation rate may be determined. F. s.—S.M.J.

836 Chodat, F. and Dang, K. D. Modifications tissulaires provoquées par l'effeuillage chez le lin. **[Modifications in the tissues of flax caused by defoliation.]** *Communication presented on the occasion of the " Commémoration Léo Errera " Univ. libre de Bruxelles, 10–12 Sept. 1958* 1960, pp. 63–84, bibl. 20, illus. [Inst. Bot., Univ. Genève, Switzerland]

This article describes modifications in the tissues of *Linum austriacum* caused by stripping off the leaves. Those observed in *L. usitatissimum* and *L. angustifolium* were similar but less marked.—E.B.O.

837 Anselme, I. C. Problèmes liés au rouissage à terre du lin en France. Étude préliminaire. **[Problems connected with retting flax on the ground in France. Preliminary study.]** *Fibra* 1960, **5**, No. 3, 83–7. [Sta. Cent. Path. Vég., INRA, France]

HIBISCUS SPP.

838 Togliani, F. *L'Hibiscus cannabinus*, alternativa di produzione agraria nell'area risicola. **[*Hibiscus cannabinus*, an alternative crop in the rice area (of Italy).]** *Riso* 1960, **9**, No. 12, 10–13, illus.

In trials in Italy during the past few years the possibility was investigated of introducing the cultivation of kenaf, with a view to replacing rice to some extent. Kenaf has shown good adaptation to the climate of the Italian rice area where suitable soils are also present. It is pointed out that loose, well drained soils are preferable. Kenaf is grown as a renovating crop and is sown in late Apr. to early May. The seed is drilled at 40 kg/ha in rows 15–16 cm apart. As kenaf requires a total rainfall of 500–600 mm, it must be irrigated when grown in Italy. It is harvested in mid-Sept. The fibre yield (average of 4 years) was about 3000 kg/ha. [See also *Fld Crop Abstr.* 11 : 747 and 14 : 348.]—E.B.O.

839 Arnoux, M. and Franquin, P. Bilan de dix années de recherches sur les fibres jutières à la Station de l'I.R.C.T. de Madingou. **[Results of 10 years of investigations on jute-substitute fibres at the IRCT Station at Madingou (Niari Valley, Middle-Congo).]** *Cot. et Fibr. trop.* 1960, **15**, No. 1, 69–80, bibl. 5, English summary.

In the region of the trials the growing, by mechanized cultivation, of jute-substitute fibres (mainly *Hibiscus* spp. and, to a lesser extent, *Urena lobata*) is feasible but does not give economic returns. The fibre of *U. lobata* is of good quality, and approaches that of jute, but the crop is affected by disease and is difficult to decorticate. The fibre of *Hibiscus* spp. is of poorer quality than that of jute or *U. lobata*. Of *H. cannabinus* 2 varieties are present ; the var. *vulgaris*, early, has a vegetative cycle of 90 days, is grown during Nov.–Feb. and yields about 1200 kg of dry fibre/ha ; the var. *viridis*, late, has a vegetative cycle of 6–7 months, is grown during Nov.–May and yields about 2000 kg of fibre/ha. *H. sabdariffa* has a vegetative cycle of intermediate length between the early and late varieties of *H. cannabinus* and yields about 2000 kg fibre/ha.—E.B.O.

URENA LOBATA

See also Abs. 839

840 Institut National pour l'Étude Agronomique du Congo Belge. [*Urena lobata.*] *Rep. INÉAC 1959* 1960, 210 and 221.

At Luala the yields of 7 *Urena lobata* varieties ranged from 2599 to 2788 kg of fibre/ha.—E.B.O.

OIL CROPS

SESAME

841 Singh, H. and others. **Effect of N, P and K on the yield and oil content of sesame.**

Indian J. Agron. 1960, **4**, No. 3, 176–81, bibl. 6. [Agric. Coll., Bapatla, Andhra Pradesh, India]

The yield of oilseed per acre increased significantly by application of nitrogen at the rate of 25 lb N per acre. Nitrogen tended to lower the content of oil in the seed while P_2O_5 and K_2O improved it. N and P_2O_5 increased the number of capsules per plant and number of seeds per capsule. F. s.—A.G.G.H.

842 Hanawa, J. **Late embryogeny and histogenesis in *Sesamum indicum* L.** [Japanese] *Bot. Mag. Tokyo* 1960, **73**, No. 867, 369–76, bibl. 26, illus., English summary. [Dep. Biol., Tokyo Metropolitan Univ., Setagaya-Ku, Tokyo]

OIL-SEED FLAX

See also Abs. 832, 834

843 McGregor, W. G. **Flax in Canada.** *World Crops* 1960, **12**, No. 10, 381–4, illus.

A brief history of flax production in Canada is given. The crop is now grown mainly for oil. Its cultivation, harvesting and storage are outlined. See also Review Article in *Fld Crop Abstr.* **13**, No. 2. —S.M.J.

844 Henne, R. C. and Friesen, G. **A comparative study of the effects of TCA and dalapon on flax.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, **22**. [Univ. Manitoba, Winnipeg] [Received May, 1960]

TCA was applied at 4 and 8 lb/ac and dalapon at 1 and 3 lb/ac to Redwood, Raja and Marine [oil-seed] flax grown under weed-free conditions. In 1958 the TCA treatments had no visible effect on the flax plants while in 1959 the higher rate caused slight stunting. Dalapon at 1 lb/ac produced signs of slight leaf tip burn in 1959 only, but the 3 lb/ac rate severely damaged the flax in both years. In 1958 TCA at 4 lb/ac had no effect on yield, while the 8 lb/ac rate affected the variety Marine. Dalapon at 1 lb/ac was fairly satisfactory, but at 3 lb/ac caused severe yield reductions in all 3 varieties. In 1959 both TCA and dalapon caused yield reductions. In 1958 TCA at either 4 or 8 lb/ac and dalapon at 1 lb/ac did not affect oil content or oil quality of the flax seed.—A.M.H.

SAFFLOWER

845 Hore, H. L. and Sims, H. J. **Safflower trials in the Victorian wheat belt.** *J. Dep. Agric. Vict.* 1960, **58**, Pt 7, 407–10, bibl. 8.

The cultivation of safflower is described. The results of comparative trials at 4 cereal research centres in Victoria indicated that safflower gave more variable and lower yields than wheat. At Longerenong and Walpeup safflower outyielded linseed. Oil content ranged from 36 to 44%.—S.M.J.

SUNFLOWER

846 Renea, S. and Olteanu, Florica. Contribuţii la stabilirea unor măsuri agrotehnice la floareasoarelui în condiţii de irigare. [**Some cultivation measures for the growing of sunflower under irrigation.**] *Anal. Inst. Cercetari agron.* 1959/60, **27**, Ser. B, 33–41, bibl. 7, Russian and French summaries.

In a 3-year cultural trial with sunflowers, all the plots received 2 – 3 irrigations and the following fertilizers in kg/ha : N 100, P_2O_5 80, and K_2O 135. Conclusions reached are as follows. The optimal sowing distances are 70 × 70 cm with 2 plants per pocket giving an average yield of 3311 kg seed per ha, and 60 × 40 cm with a single seed per pocket giving an average yield of 3218 kg seed per ha. The 60 × 40 cm distance enables cultivation to be done under the best conditions. Optimal planting density is 41–45 thousand plants/ha. Increasing the density beyond 45,000 plants/ha brought no increase in yield and depreciated the quality of the crop. In 1958 the variety VNIIMK 6540 yielded less seed but the seed was of a better quality than that of the variety Idanov. Irrigation should be done only during the critical phases of growth, namely, head formation, flowering and seed formation. The amount of water to be applied ranges, according to weather, from 1200 to 1800 cub. m/ha. F. Fr. s.—G.M.R.

847 Nicolae, V. and others. Efectul ingrăşămintelor minerale aplicate la floareasoarelui la Staţiunea Experimentală Agricolă Valul-lui-traian. [**Effects of mineral fertilizers in the cultivation of *Helianthus* at the Valul-lui-Traian Agricultural Experiment Station.**] *Anal. Inst. Cercetari agron.* 1958–59, **26**, Ser. A, 73–83, bibl. 5.

In 3-year trials, *Helianthus* [*annuus*] responded best to the application of superphosphate only, less favourably to superphosphate + potassium or to complete NPK. Superphosphate at the rate of 40 kg P_2O_5 per ha, incorporated in the soil by autumn tillage, resulted in an increase in yield of 430 kg seed per ha, or 18·6%. Potassium salts did not increase production, and ammonium nitrate did so in one year only, when the period of head formation and flowering coincided with abundant rainfall. In the case of all the fertilizers (P, PK and NPK), incorporation in autumn to a depth of 20 – 22 cm under tillage was the most satisfactory technique, except that ammonium nitrate gave better results when applied in the summer on the appearance of 2 pairs of leaves, when flowering coincided, as in 1956, with abundant rainfall. F. s. —G.M.R.

848 Vaadia, Y. **Autonomic diurnal fluctuations in rate of exudation and root pressure of decapitated sunflower plants.** *Physiol. Plant.* 1960, **13**, No. 4, 701–17, bibl. 22. [Dep. Irrig., Univ. Calif., Davis, California]

849 Bonfanti, M. A. Perspectives du tournesol en Argentine. [**Future possibilities for sunflower in Argentina.**] *Oléagineux* 1960, **15**, No. 10, 715–18, illus.

RAPE

850 Statens Forsøgsvirksomhed i Plantekultur, Denmark. Forsøg med stigende mængder kalksalpeter til vinterraps 1956–59. [**Trials with increasing amounts of calcium nitrate for winter rape 1956-9.**] *Medd. 632 Stat. Forsøgsvirk. Plantekult.* 1960, pp. 2.

During 1956–9, 12 experiments with winter rape [*Brassica napus* var. *oleifera* subvar. *biennis*] were carried out on clay soil at 4 centres in Denmark. With 1 exception the preceding crop was a cereal. Plots received 200–400 kg superphosphate and 120–455 kg K fertilizer/ac. $Ca(NO_3)_2$ was applied in early spring at 0, 400, 800, 1200 and 1600 kg/ha at the beginning of growth following sowing the previous Aug. At harvest in July, seed yield, crude-oil and crude-protein content had increased with applications of $Ca(NO_3)_2$ but total yield per increment of 400 lb fell sharply with increasing applications. Crude-oil content decreased, protein content and 1000-grain weight increased and the harvest date was delayed with increasing applications of $Ca(NO_3)_2$.—S.M.J.

851 Torsell, B. **The importance of winter rape and winter turnip rape in Swedish crop production.** *Växtodling, Uppsala* 1959, No. 15, pp. 168, illus., bibl. 186. [Dep. Pl. Husb. Roy. School Agric. Sweden]

A very full account is given of a Swedish investigation begun in 1953. Rape was found to be more hardy than turnip rape, the difference between the species being greater after early than after late sowing. The results of freezing tests revealed the following order of hardiness in the organs ; root < lower part of the epicotyl < upper part of the epicotyl < terminal bud, i.e. an increase in hardiness of the organs with their height above ground level. It is concluded that the lower susceptibility of turnip-rape varieties to frost killing is mainly due to its well-adapted growth habit. A plant type is needed with the growth habit of turnip rape, plus hardiness and yielding capacity not lower than those of rape.—A.G.G.H.

MUSTARD

See also Abs. 584.

852 Husain, A. **Effect of certain fungicides on germination and growth of rape and mustard.** *Indian Oilseeds J.* 1960, **4**, No. 3, 174–5, bibl. 6. [Reg. Res. Centre (Oilseeds and Millets) ICAR, Kanpur]

Percentage germination and seedling vigour in *Brassica juncea* and *B. campestris* var. yellow sarson were considerably improved by dusting with ceresan, ceredon, agrosan GN, dithane Z 78, or captan at 2 g fungicide per 1 lb seed. The cost of treatment is less than 1 anna per acre, and less seed is required. Dithane Z 78 and captan are safer to use and almost as effective as organic mercurial compounds.—D.B.

853 Pradhan, M. G. and others. **Control schedule for mustard crop particularly against mustard aphid.** *Indian Oilseeds J.* 1960, **4**, No. 3, 125–41, bibl. 3. [Div. Entom., Indian Agric. Res. Inst., New Delhi]

The results of 3 years experimental investigations on the control schedule for a mustard (*Brassica campestris*) crop, particularly against the mustard aphid (*Lipaphis erysimi*), are described. An attempt was made to determine the comparative field efficiency of different insecticides. The criteria taken into consideration for determining their efficacy were : (1) reduction in aphid population immediately after spraying ; (2) the protective effect of the residues of these insecticides ; (3) absolute population of aphids ; (4) crop yield ; (5) effect of these insecticides on *Coccinella septempunctata*, a predator of aphids ; (6) phytotoxicity of these insecticides and (7) the economics of the spray schedules. Each of these criteria has its characteristic limitations which are also discussed. The choice of insecticide lies between pestox, *gamma* BHC, parathion and diazinon. Of these, the last two adversely affect *C. septempunctata*, and pestox may leave a residue in the mustard seed. The treatment recommended is 2 or 3 sprayings of 0·1% Υ-BHC applied at intervals of 20–30 days, depending on the rate at which the aphid population builds up in a particular season. F. S.—D.B.

GENERAL

854 Ollagnier, M. Sur le développement des oléagineux au Brésil. [**The development of oil crops in Brazil.**] *Oléagineux* 1960, **15**, No. 11, 749–55, illus.

The principal annual oil crops are cotton, groundnuts, soyabean and linseed. The cultivation of soyabean and groundnuts is extending rapidly in the southern regions.—E.B.O.

MISCELLANEOUS CROPS

BUCKWHEAT

855 Šustova, A. P. [**The causes of lowered yields of buckwheat under deficient**

intensity of light.] [Russian] *Agrobiologija* (*Agrobiology, Moscow*) 1959, No. 6 (120), 888–93, bibl. 11.

Many studies have shown that in several crops (barley, wheat, oats, proso millet and cotton) there is a critical period in which the plants are sensitive to a deficiency of light. This period begins at the stage of tetrad formation in the pollen mother-cells and lasts for 8–10 days. If light is deficient during the critical period, yields of the crops are lowered. During 1952–3 the author showed that the growth and development of *Fagopyrum esculentum* are also retarded by deficient light intensity even when the deficiency is of short duration. (Papers from Leningrad Agric. Inst., Part 9, 1955.) The present work was carried out with the buckwheat variety Aleksandrovskaja 134 in Puškin on plots (3 replications) of the Leningrad Agric. Inst., light intensity being reduced at the critical period to 18–20% of natural daylight. Grain yields were computed from observations of the growing points and flower development. There is evidence that a deficiency of light intensity at the critical period weakens the meristematic activity of flower initiation. Flowers in the controls were initiated during 22–24 days, and in the shaded plants during 33–35 days. Grain and leaf formation are consequently impeded, leaf surface at the end of the vegetative period being 78% of that in the control. These effects are not overcome even when light intensity is adequate subsequent to the plants' critical period.—M.H.

856 Sirota, N. S. **Increased seed production of buckwheat.** [Russian] *Zemledelie* (*Agriculture, USSR*) 1960, **8**, No. 11, 42–3. [Kyzovatovsk District, Ul'janovsk Province]

During 1957–60 yields of buckwheat [*Fagopyrum esculentum*] seed in the Ul'janovsk Province, USSR, have decreased. In the dry season of 1960 the yield was only 500 kg/ha. Recommendations are made on the procedure to be adopted in 1961. —S.M.J.

857 Pisanko, S. P. **[Study of the technological process used for cleaning and grading seed of buckwheat and millet.]** [Russian] *Vestn. S-H. Nauki* 1960, **5**, No. 11, 73–80, bibl. 6, English, German and French summaries. [All-Union Inst. Agric. Mechanization]

From a study of *Panicum miliaceum* and *Fagopyrum esculentum* seed (together with their associated weed seeds) and their grading by means of sieves, graders and air-blowing installations, it is concluded that the process with 2 grading channels for cleaning and grading seed according to their aerodynamic properties is the most satisfactory. F. Eng. s.—M.H.

GENERAL

858 Krüger, W. **Antibiotics as seed protectants (1958/59).** *S. Afr. J. agric. Sci.* 1960, **3**, No. 3, 409–18, bibl. 7. [Coll. Agric. and Exp. Sta., Potchefstroom]

Several fungicidal antibiotics were tested as seed protectants for the control of seedling rot (*Diplodia zeae*) of maize, seedling rot of groundnuts (caused by soil- and seed-borne fungi, particularly *Aspergillus niger* and *Rhizopus* sp.) and sorghum kernel smut (*Sphacelotheca sorghi*). They were applied as solutions and slurries for maize, as powders for groundnuts and as powders and slurries for sorghum seed. *Diplodia* infection was reduced more when the antibiotics were used in solutions instead of slurries. Neither solutions nor slurries were as effective as the mercury-containing trigosan. Most of the solutions were injurious to maize ; the slurries were less detrimental. Thiolutin improved, while 100 i.u. acti-dione per kg seed administered as a slurry, decreased germination of maize. The emergence of groundnuts was increased by filipin and thiolutin. Acti-dione and its derivatives A, S and T as powders and slurries controlled sorghum smut. Filipin, P-165 and thiolutin prevented infection only when used as slurries. F. s.—S.M.J.

CROP BOTANY

GERMINATION AND GROWTH

859 Blaim, K. **The effect of coumarin on uptake of water by seeds.** *J. exp. Bot.* 1960, **11**, No. 33, 377–80, bibl. 13. [Inst. Soil Sci. Cult., Puławy, Poland]

There is a marked effect of coumarin on the water uptake of wheat seeds : uptake by the embryo is inhibited, but uptake by the endosperm is unaffected. Even in the early ' swelling ' stage, water uptake by embryo and endosperm thus appears to involve 2 distinct mechanisms. It is suggested that the inhibitory effect of coumarin on germination is primarily due to its effect on water uptake by the embryo. F. s.—M.H.

860 Leblova, S. and others. Vliv organických isothiokyanátů na růst a metabolismus rostlin. 1. Působení allylisothiokyanátů na klíčení a růst řepky, pšenice a hrachu. **[The influence of organic isothiocyanates on the growth and metabolism of plants. 1. The effect of allylisothiocyanate on the germination and growth of rape, wheat and peas.]**

Rostlinná Výroba 1960, **6** (33), No. 5, 651–62, bibl. 51, German and Russian summaries.

The effect of allylisothiocyanate (AITC) upon the germination and growth of rape, wheat and peas was tested at concentrations ranging from 10^{-4} to 10^{-2} *M*. The inhibitive action of AITC on the germination of pea and rape seed was not perceptible until concentrations of 5×10^{-3} *M* and over had been reached, but in wheat it was already seen at a concentration of 10^{-3} *M*. Inhibition of development in seedlings of peas and rape was seen at concentrations of $2{\cdot}5 \times 10^{-3}$ *M* and over, in wheat at a concentration of 10^{-4} *M*, although with the lower concentrations it was not so clear. The inhibitive effect was shown by the shorter roots and seedling axes and in the lower weight of the seedlings. The effect upon the water relations of the seedlings was on the whole insignificant. The inhibition is most strongly exercised in the initial phase of germination and is weakest in the later stages of development. F. Ger. s. —G.M.R.

861 Neales, T. F. **Some effects of boron on root growth.** *Aust. J. biol. Sci.* 1960, **13,** No. 3, 232–48, bibl. 41, illus. [Bot. Sch., Univ. Melbourne]

Beans (*Vicia faba* and *V. faba* var. *minor*), peas, maize and flax were grown in B-free culture solutions. The absence of B in the root environment reduced total linear growth of the radicles of the 5 species. After 4 days' growth, the growth rate of the maize radicle was comparable to that when B was present but the growth of radicles of *V. faba* var. *minor* ceased. The minimum B requirement for unrestricted growth of the *V. faba* var. *minor* radicle over 120 hr was 0·005 ppm. Each μ g B in this medium evoked a mean radicle elongation of 51 mm. Reserves of B in the radicle tip were sufficient to support only about 5 hr of growth at the plus-B growth rate. No regrowth occurred from the tips of radicles immersed for 72 hr or more in solutions lacking B. An analogy is suggested between the effects of B deficiency and X-irradiation on the bean root tip. The influence of B deficiency on lignification and differentiation in the bean radicle is discussed. F. s.—s.m.j.

862 Brian, P. W. and others. **Inhibition of rooting of cuttings by gibberellic acid.** *Ann. Bot., Lond.* 1960, **24,** No. 96, 407–19, bibl. 22. [Akers Res. Lab., ICI Ltd, Welwyn]

Gibberellic acid inhibited rooting but increased extension of pea and bean stem-cuttings. Indolylacetic acid usually had a contrary effect both on extension and on root initiation. It was possible to separate the effects of gibberellic acid on extension and on rooting. It is necessary to discard an earlier hypothesis that inhibition of rooting by gibberellic acid is a consequence of a diversion of essential metabolites to the extending apical regions of the cutting. The antagonism between gibberellic acid and indolylacetic acid was non-competitive. Gibberellin A_1, known to occur naturally in *Phaseolus*, was as active a rooting inhibitor as gibberellic acid. It is now believed that inhibition of rooting of cuttings by gibberellins is a direct local effect, preventing those early cell divisions involved in transformation of mature stem tissues to a meristematic condition. F. s.—m.h.

863 Boo, L. **Effect of gibberellin on the growth in length of polyploids.** *Svensk bot. Tidskr.* 1959, **53,** No. 3, 283–5. [Dep. Plant Physiol., Univ. Stockholm]

The stimulating effect of gibberellin on growth in length was studied in tetraploids and diploids of rye and other species, and found to be less in the tetraploids than in the diploids.—e.b.o.

864† Schaeverbeke, J. Action de la gibbérelline sur l'allongement des filets staminaux chez les Graminées. [**Effect of gibberellin on the elongation of stamen filaments in the Gramineae.**] *C.R. Acad. Sci., Paris* 1960, **251,** No. 11, 1176–8, bibl. 3.

Gibberellin favoured the elongation of young stamen filaments in the Gramineae, while auxins had no effect. In *Pennisetum typhoideum* this effect was obtained by treatment with gibberellin only, but the simultaneous addition of sugar increased this effect.—e.b.o.

865 Wickson, M. and Thimann, K. V. **The antagonism of auxin and kinetin in apical dominance. 2. The transport of IAA in pea stems in relation to apical dominance.** *Physiol. Plant.* 1960, **13,** No. 3, 539–54, bibl. 15. [Harvard Biol. Labs, Cambridge, Mass., USA]

866† Marrè, E. Sulla regolazione della crescita nelle piante superiori. [**On growth regulation in higher plants.**] *Nuovo G. bot. ital.* 1959, **66,** No. 3, 461–93, bibl. 74, English summary. [Ist. Bot. Univ. Milano, Italy]

867† Brougham, R. W. **The relationship between the critical leaf area, total chlorophyll content, and maximum growth-rate of some pasture and crop plants.** *Ann. Bot., Lond.* 1960, **24,** No. 96, 463–74, bibl. 27. [Grassl. Div., DSIR, Palmerston north, N.Z.]

The amounts of leaf and of chlorophyll per unit area of land exposed to light above 400–500 f.c. on sunny days at local noon were determined for pure stands of herbage plants, maize and kale, growing under near-optimum conditions. The values obtained for the grass species and maize were significantly higher than those of the dicotyledonous

species. There was a highly significant correlation ($r = +0{\cdot}912$) between the maximum growth rates (dry-weight increases in plant organs below 1 in. above ground level were not accounted for) of the different species and the amounts of chlorophyll above the measurement level per unit area of land. However, the index — growth rate/total chlorophyll — was higher for species in which the leaves were disposed horizontally or where flagging occurred (clovers, kale, and maize) than for the herbage grasses, suggesting either that the chlorophyll of the first group of species was more active or efficient in photosynthesis than the chlorophyll in the species with erect leaves, or that a greater proportion of dry matter produced was accumulated in underground organs of these erect-leaved species. There was a significant correlation ($r = +0{\cdot}815$) between the leaf-area index absorbing 95% of the light and the maximum growth-rates of the different species, but this relationship did not take account of the photosynthetic activity of other parts of the plant or of species differences in chlorophyll content. The results are discussed in relation to the availability and utilization of light energy and carbon dioxide by the species examined. F s.—M.H.

868 Journal of the Linnean Society of London. **A Symposium. Experimental approaches to the problems of growth and form in plants. 19 and 20 December, 1958.** *J. Linn. Soc. (Bot.)* 1959, **56,** No. 366, bibl., illus.

The following papers are included : Some factors concerned in the growth of stolons in potato, by A. Booth ; Morphogenetic effects of the gibberellins, by P. W. Brian ; Some growth responses to gibberellic acid (in *Gossypium hirsutum, Hibiscus cannabinus, Corchorus olitorius, Cannabis sativa* and other plants), by M. W. Stant ; The effect of very long days on the flowering of winter rye, by O. R. Jewiss ; Growth substances and flower morphogenesis, by J. Heslop-Harrison ; Temperature-induced meristic and other variation in *Cannabis sativa*, by Y. Heslop-Harrison and I. Woods.—E.B.O.

METABOLISM AND PLANT CHEMISTRY

869 Jensen, G. **Effects of temperature and shifts in temperature on the respiration of intact root systems.** *Physiol. Plant.* 1960, **13,** No. 4, 822–30, bibl. 27. [Lab. Pl. Physiol., Roy. Vet. Agric. Coll., Copenhagen, Denmark]

The respiration of intact root systems of maize variety Delikatesse was investigated at temperatures ranging from 5–35°C. The gas exchange quotient (G.Q.) and temperature coefficients (Q_{10}) were computed. The value of Q_{10} decreased, and the GQ value increased, with increasing temperatures.—S.M.J.

870 McWhorter, C. G. and Porter, W. K. **Studies on the metabolism of plants treated with 3-amino-1,2,4-triazole.** *Physiol. Plant.* 1960, **13,** No. 3, 444–9, bibl. 7. [Delta Branch Exp. Sta., Stoneville, Mississippi ; Dep. Bot. Pl. Path., LSU, Baton Rouge, Louisiana, USA]

Four- or five-day-old maize seedlings were treated with Hoagland solution which contained 80 mg amitrol/l. The respiratory quotient of the tissue of treated plants was 0·82 compared with 1·01 of untreated plants. Amitrol-induced chlorotic tissue contained 51% total carbohydrates while untreated plants contained 31·86% (on a dry weight basis). There was a gradual decrease in fat content in seeds of untreated plants but a marked increase in fat content in seeds of chlorotic plants, due, it is postulated, to the conversion of carbohydrates to fats. Sodium fluoride caused the same degree of inhibition of respiration in normal and chlorotic tissue but iodoacetate and malonate inhibited O_2 uptake more in chlorotic tissue than in control tissue.—S.M.J.

871 Wolf, F. T. **Influence of amino triazole on the chloroplast pigments of wheat seedlings.** *Nature, Lond.* 1960, **188,** No. 4745, 164–5, bibl. 7. [Biol. Dep., Vanderbilt Univ., Nashville, Tennessee]

Data from the author's tests indicate that the net rate of chlorophyll synthesis (excess of synthesis over destruction) is greatly reduced by $10^{-4}M$ amino triazole. There is, apparently, no direct action of amino triazole on the rate of chlorophyll destruction, at least in darkness. It is supposed that the effects of amino triazole on plastid pigments are secondary to the effect on the plastid itself.—M.H.

872 Swenson, G. and Burström, H. **On the influence of auxins on salt and water uptake.** *Physiol. Plant.* 1960, **13,** No. 4, 846–54, bibl. 14. [Dep. Plant Phys., Lund, Sweden]

The influence of growth-inhibiting concentrations of 2 auxins, 1-NAA and 2,4-D, and coumarin and GA on the simultaneous uptake by wheat plants of K, Na, Mg and Ca was studied. The presence of auxin reduced K-uptake ; if K was absent Na-uptake was decreased, but if Na was scarce, Mg but not Ca uptake was reduced. Auxin reduced the uptake of ions in the following order : K > Na > Mg > Ca. Decapitation of the roots resulted in slower water- and salt-uptake and slower leaf growth than in entire plants, but did not annihilate the auxin effect. Where K was present, auxin reduced K or Na uptake more than that of water.—S.M.J.

873 Michael, C. and Schilling, G. Strontium in der höheren Pflanze. 1. Die Aufnahme

des Strontiums durch Erbsen und Hafer und seine Wirkung auf das Pflanzenwachstum. [**Strontium in higher plants. 1. The uptake of strontium by peas and oats and its effect on plant growth.**] *Z. PflErnähr. Düng.* 1960, **91**, No. 2, 147–58, bibl. 35. [AgrikChem. Inst., Univ. Jena, E. Germany]

874† Bergmann, W. Die Bedeutung der Mikronährstoffe, insbesondere des Molybdans in der Landwirtschaft und im Gartenbau. [**The importance of micronutrients, especially molybdenum, in agriculture and horticulture.**] *Z. landw. Vers. UntersuchWes.* 1959, **5**, No. 5, 395–415, bibl. 3, illus. English and Russian summaries. [Inst. landw. Versuchs- u. Untersuchungswesen, Jena-Zwätzen, E. Germany]

875† Roder, W. Über Beziehungen zwischen Alter, Trockensubstanzausbildung und Transpirationsintensität bei einigen zweikeimblätterigen Kulturpflanzen. [**Relationships between age, dry-matter production and transpiration intensity in some dicotyledonous crop plants.**] *Albr.-Thaer-Arch.* 1960, **4**, No. 2, 77–90, bibl. 29, Russian summary. [Hochsch. f. Landwirtschaftliche Produktionsgenossenschaften Meissen, E. Germany]

The relationship between dry-matter production and transpiration intensity was studied at 4 growth stages in *Pisum arvense*, *Medicago media*, *Sinapis alba* and *Beta vulgaris*. At the 1- to 2-leaf stage there was a significant negative correlation between these 2 functions ; at the 4- to 6-leaf stage there was no correlation ; and at the 8- to 12-leaf stage there was again a significant negative correlation which became greater as the age of the plant increased. The 3 types of *Beta vulgaris* (fodder-beet, half-sugar-beet and sugar-beet) can be distinguished by determining the dry-matter content of leaves at the 3- to 4-leaf stage. F. Ger. s.—D.B.

876† Young, J. R. **The role of hemicelluloses in the oat plant.** *Diss. Abstr.* 1960, **21**, No. 1, 46. [Purdue Univ., Lafayette, Indiana]

Actively growing oat plants were permitted to undergo photosynthesis in the presence of $^{14}CO_2$ for 4 hr. Leaf and stem samples were taken at intervals of several days until plant maturity, and the radioactivity of the cellulose, hemicellulose A and hemicellulose B was determined. Total radioactivity rose during the first 5 days after labelling and then remained constant, indicating that the hemicelluloses of oats are stable end-products of metabolism and their function in the plant is a structural one.—R.B.

877 Kursanov, A. L. **The transport of organic substances in plants.** *Endeavour* 1961, **20**, No. 77, 19–25, bibl. 34, illus. [K. A. Timiriazev Inst. Pl. Physiol., Acad. Sci., Moscow, USSR]

Present knowledge on this subject is reviewed with special reference to recent research in the Soviet Union.—S.M.J.

ENVIRONMENT

878 Börner, H. Über die Bedeutung gegenseitiger Beeinflussung von Pflanzen in landwirtschaftlichen und forstlichen Kulturen. [**On the importance of the reciprocal influence of cultivated plants in agriculture and forestry.**] *Angew. Bot.* 1960, **34**, No. 3/4, 192–211, bibl. 60, illus.

This lecture was confined to a review of allelopathic phenomena of agricultural importance, for example competition between crop plants (cereals or potatoes) and weeds, and soil sickness and self-incompatibility in higher plants. For further details of some of the author's work (on flax and rye, mustard and oats) referred to in this paper, see *Fld Crop Abstr.* 9 : 801, 10 : 1113 and 1385, 11 : 1184, and 12 : 413.—D.B.

879† Woods, F. W. **Biological antagonisms due to phytotoxic root exudates.** *Bot. Rev.* 1960, **26**, No. 4, 546–69, bibl. 217.

880 Burström, H. **Influence of iron and gibberellic acid on the light sensitivity of [excised wheat] roots.** *Physiol. Plant.* 1960, **13**, No. 3, 597–615, bibl. 35. [Inst. Pl. Physiol., Lund, Sweden]

881 Mándy, G. Új ökológiai vizsgálati módszer és eddigi eredményei. [**A new ecological experimental method and results obtained to date.**] *Kisérl. Közl.* 1959, **52A**, No. 4, 3–24, bibl. 4, Russian and German summaries. [Agric. Res. Inst., Iregszemese, Hungary]

An account is given of the use of the method wherein plants are sown at graded intervals in the same locality and the same year and are studied for their growth rhythm by means of weekly observations. Oats, peas, beans and sunflowers were sown at intervals, and weekly records of growth began when the plants had reached a height of 5 to 10 cm. Tables show for each week and for each sowing the growth recorded ; also the temperature and rainfall. Optimal growth in these crops was reached under the following conditions : temperature in °C ; oats 17–18, peas 12–13, beans about 19, sunflowers 18–19 ; rainfall in mm ; oats 160–170, peas 70–80, beans about 110, sunflowers 200–220. Peas are thus shown to have the lowest temperature and rainfall requirements for optimal growth. F. Ger. s.—G.M.R.

882† Butenko, R. G. and others. [**The biological importance of diversity in the**

photosynthetic products of plants.] [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1960, **135,** No. 1, 210–12, bibl. 9, illus. [Timirjazev Inst. Pl. Physiol., Acad. Sci. USSR]

The authors' experiments confirm their views that the chemical specificity of plants is determined by their reaction to various environments, this reaction being initiated by the different products of photosynthesis, which, in turn, are dependent on the spectral composition of the light in which photosynthesis takes place.—M.H.

883† Boguslawski, E. von, and Limberg, P. Phänologische und physiologische Daten zur Charakteristik der Produktivität unserer Kulturpflanzen. 1. Mitteilung. [**Phenological and physiological data which determine productivity of our crop plants. 1st communication.**] *Z. Acker- u. PflBau* 1960, **111,** No. 1, 1–22, bibl. 45, English Summary. [Inst. f. PflBau u. PflZücht., Univ. Giessen, German Fed. Rep.]

The paper provides an analysis of: (1) environmental factors (e.g. light, temperature, water, nitrogen and other nutrients, and cultivation techniques) which determine plant yield; (2) the growth and development stages during which they are effective; and (3) the yield-forming characters (e.g. number of tillers, flowers, or grains per ear, plant height, yield per unit area, leaf/stem ratio) which the environmental factors influence. —D.B.

PHASIC DEVELOPMENT

884 Razumov, V. I. and Oleĭnikova, T. V. [**Dependence of the vernalization reaction on daylength.**] [Russian] *Agrobiologija* (*Agrobiology, Moscow*) 1959, No. 6 (120), 874–82, bibl. 21. [Puškin Lab. of All-Union Inst. Pl. Prod., Puškin, Leningrad Province]

From the literature on this subject it is apparent that spring cereals react feebly to vernalization of the seed when the plants are subsequently grown in either long or short days. If winter cereals are grown in long days after seed vernalization, their reaction to the treatment is acute and the reaction of interchangeable types from vernalized seed depends on the daylength in which they are grown. The authors' tests were made to elucidate this division of crops according to their reaction to vernalization and daylength. The data show that winter wheat when grown in long days will ear quickly if the seed is vernalized at 2°C for only a short period (e.g. 40–45 days for Ukrainka winter wheat), although this duration of the vernalizing process is insufficient for earing if the plants are grown in short days. An excessive extension of the vernalizing period does not result in earlier earing when the plants are grown in short days. A period of 80 days for Ukrainka wheat and Petkus winter rye is adequate for completion of the vernalization stage, and devernalization [see *Fld Crop Abstr.* 5 : 966] cannot occur. Winter plants grown from seed in which the vernalization stage is completed during 70 days pass the photophase more quickly than do plants from seed vernalized for only 40 days. Spring crops (wheat, barley, peas, vernalized at 2–5°C for 30 days) which have vegetated in southern countries (Syria, Egypt) in winter months are similar to interchangeable types in their reaction to vernalization, this reaction depending on the length of day in which they are grown. If grown from vernalized seed in a 24-hr day, earing is not expedited, but if grown in short days [12-hr] earing is accelerated by 13–23 days. The biological significance of such reactions is apparently connected with the need of these varieties to ear in the early months of the year (March/April) under short days. The duration of the vernalization phase in typical spring varieties of wheat and barley is not more than 15 days. Increasing vernalization to 40 days does not advance earing to a date before that obtained from 15 days' vernalization. Vernalized seed of long-day spring crops may thus be used for [autumn] stubble sowings, since the crops would grow in relatively short days.—M.H.

885† Fedorov, A. K. [**The reaction of plants to light conditions as a feature of adaptation.**] [Russian] *Ž. Obšč. Biol.* (*J. Gen. Biol. USSR*) 1960, **21,** No. 5, 368–76, bibl. 7, illus. English summary.

Under continuous illumination (50–70 thousand lux) it is possible to obtain earing in winter crops if non-vernalized dry seed is sown at relatively high temperatures (not less than + 20°C). Depending on the variety, winter wheat forms ears under such experimental conditions in 70–105 days after shooting. Perennial winter grasses (*Festuca pratensis, Agrostis alba, Dactylis glomerata, Bromus inermis* and *Alopecurus* sp.) also form ears under these conditions. Varieties of northern origin usually form ears later than those of southern origin. There is indication that one of the differences between summer, interchangeable and winter crops is their different response to light during their early growth period. Interchangeable crops acquire a capacity to retard development in short days, with poor light intensity, while winter crops acquire a capacity to retard development in long days with good light intensity. This capacity to respond to light conditions is usually most obvious in winter-hardy varieties. F. Eng. s.—M.H.

886 Sirohi, G. S. and Hamner, K. C. **Automatic device for controlling lengths of light and dark periods in cycles of any desired duration.** *Pl. Physiol.* 1960, **35,** No. 2, 276–8, bibl. 3, illus. [Univ. California, Los Angeles]

RADIOBIOLOGY

887 Wohrmann, K. Untersuchungen über die CO_2-Abgabe von röntgenbestrahlten Samen. Ein Beitrag zum Problem der Strahlennachwirkungen. [**The liberation of CO_2 from X-rayed seeds. A contribution to the problem of after effects of irradiation.**] *Angew. Bot.* 1960, **34,** No. 3/4, 158–64, bibl. 15. [Inst. PflBau u. PflZücht., Univ. Göttingen, German Fed. Rep.]

Barley seeds were stored for 30 months (a) before and (b) after X-ray treatment at doses of 10 kr and 20 kr and then were allowed to germinate. Observations on liberation of CO_2 were made during the first 5 days of germination. It was not until the 4th and 5th days that any differences in the rate of respiration were observed. The difference was between control seeds and those irradiated at 10 kr, on the one hand, and seeds irradiated at 20 kr, on the other hand. The seeds treated at 20 kr suffered a reduction in respiration rate, and this reduction was greater when seeds had been stored after than before irradiation. A depressed rate of liberation of CO_2 was not immediately followed by a diminution in growth rate. An inhibition in growth of seedlings from treatment (b) compared with treatment (a) occurred at a later stage of germination. The greater depression in the rate of respiration after (b) than after (a) was interpreted as a consequence rather than an immediate cause of injury of the growth process.—D.B.

888 Katayama, Y. and Sakaguchi, T. **Studies on the contamination and the variation of crop plants caused by radioactivity. 2. Group-separation analysis of radioactive elements in certain crops by means of ion exchange resin.** *Bull. Fac. Agric. Miyazaki* 1960, **5,** No. 2, 179–84, bibl. 4, English summary.

By means of ion exchange resin, a group separation analysis was made of radioactive elements in the stems and leaves of rice, broad bean and yellow lupin. In these crops the highest radioactivity was found in the rare earths, alkaline earths and alkali metals, but it was low in elements belonging to the zirconium and niobium groups. F. Eng. s.—D.B.

889† Peredel'skiĭ, A. A. and others. **Dispersion of radioactive isotopes in the soil by earthworms.** [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR)* 1960, **135,** No. 1, 185–8, bibl. 4. [All-Union Sci. Res. Inst. Fodders and Inst. Biol. Phys., Acad. Sci. USSR]

In an earlier work [*Fld Crop Abstr.* 11 : 384] it was shown that ^{60}Co is absorbed in a greater than normal amount by plants when earthworms are present in the contaminated soil. Subsequently it was shown (*Doklady Akad. Nauk SSSR,* 1960, Vol. 134, No. 6) that a contamination of the soil by ^{15}Ca or ^{90}Sr in the presence of wireworms (Elateridae) results in yet greater absorption by plants of the isotopes than when earthworms are present. The authors' study has confirmed the work of Šain on the translocation of nutrients by the plant [*Herb. Abstr.* 27 : 868] and it is concluded that the absorption of the isotopes is related to root damage. The radiation/ecological role of wireworms may be greater than that of earthworms.—M.H.

890† Bose Institute. **Recent studies in India on the application of radiation and radioactive isotopes to mutation induction and to metabolic processes in plants and micro-organisms. 1. Work done at the Bose Institute.** *Sci. and Cult.* 1960, **26,** No. 4, 150–9, bibl. 90. [Bose Res Inst., Calcutta, India]

NODULES

891† Sankaram, A. **On the nature and quality of legume inoculants.** *Sci. and Cult.* 1960, **25,** No. 10, 569–75, bibl. 51. [Div. Chem. IARI., New Delhi-12]

892† Sankaram, A. and others. **Studies on selection of efficient strains of root nodule bacteria.** *Indian J. Agron.* 1960, **4,** No. 3, 140–3, bibl. 12. [Agric. Coll., Bapatla, Andhra Pradesh, India]

Ten strains of *Rhizobium* isolated from root nodules of the 3 legumes, *Phaseolus trilobus, P. radiatus* and *Crotalaria juncea,* grown in different regions were tested to determine their efficiency in nitrogen fixation on the related host. A sterile sand-culture method, described in detail, was used and found to be satisfactory. F. s.—A.G.G.H.

TECHNIQUES AND APPARATUS

893† Behrens, R. and Morton, H. L. **An environment system for plant studies with controlled temperature, humidity, and light.** *Weeds* 1960, **8,** No. 2, 182–6, illus. [Crops Res. Div. USDA, College Station, Texas]

A controlled environment chamber 8 ft square and 4 ft high with a transparent top and external illumination is described. The chamber contains 4 growth cabinets 7 ft long, 1 ft wide and 2·5 ft high, in each of which temperature and relative humidity can be individually controlled.—R.B.

894 Ronchaine, J. Entretien en serres des principales plantes tropicales cultivées. [**Maintenance of the principal tropical crops in glasshouses (in Belgium).**] *Ann. Gembl.* 1960, **66,** No. 4, 297–327, bibl. 16.

895† Demortier, G. Case lysimétrique de construction relativement simple et peu

coûteuse. [**A lysimeter relatively inexpensive and easy to build.**] *Bull. Inst. agron., Gembl.* 1960, **28**, No. 2, 139–56, illus.

896† Fomenko, I. Clasificadora de granos a base de descarga eléctrica con halo. [**Device for classifying seeds, based on electrical halo discharge.**] *Agron. trop., Maracay* 1959, **9**, No. 1, 31–3, illus.

A description is given of a mechanical device, developed by the author, for separating different types of seeds when mixed together. It is based on the principle that the quantity of electrical charge received by seeds is dependent on their specific gravity, surface area, and chemical and physical structure. This electrical apparatus can be used for separating : (a) seeds of a single crop according to size ; (b) seeds of different oil content ; (c) seeds with hulls from those without ; (d) sound seeds from damaged or diseased seeds ; (e) weed seeds from crops seeds.—E.B.O.

897† Pilet, P.-E. Analyse biochromatographique des auxines radiculaires. Techniques et résultats. [**Biochromatographical analysis of root auxins. Techniques and results.**] *Rev. gen. Bot.* 1958, **65**, No. 777, 605–33, bibl. 59. [Seen Oct., 1960]

A technique for the chromatographical analysis of growth substances is described. The results given refer to roots of *Lens culinaris*.—E.B.O.

WEEDS AND WEED CONTROL

Where weeds are specific to a crop, see under the crop concerned.

SPECIFIC WEEDS

898 Canada Department of Agriculture. **Cultural control of wild oats.** *Publ. 1044 Canada Dep. Agric.* 1959, pp. 14, illus.

This bulletin summarizes work done at a number of locations in western Canada. Where land is seriously infested, the top 4 in. of soil may contain up to 50 bu of wild-oat seed per ac. In areas where only spring-sown cereals are grown, the most effective control is to delay sowing until early June and use the interval to destroy as many crops of wild-oat seedlings as possible by tillage. Where autumn-sown wheat and rye are usual, these crops should be grown exclusively for several years in succession. If mixed farming is practised, a grass ley left down for at least 3 years is also effective. Other helpful practices are : tillage in the autumn, as well as in early spring, and again after sowing ; generous seed rates and fertilizer applications to encourage early establishment ; oats grown to cut green for fodder. Burning stubble or straw does not kill wild-oat seed effectively, and is not recommended because it exposes the land to erosion.—J.D.J.

899 Hannah, L. H. **Avadex, a selective wild oat herbicide.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 50. [Received May, 1960] [Monsanto Chem. Co., St. Louis, Mo.]

Field tests of avadex in Manitoba, Saskatchewan and Alberta are reported. When incorporated in the soil, 1·5 lb avadex/ac gave good control (90–99%) of wild oats. Flax, barley, sugar-beet, sunflowers, peas, rape and possibly wheat were tolerant of rates of avadex satisfactory for wild-oat control.—A.M.H.

900 Deming, J. M. and others. **Introductory studies of an effective wild oat control chemical.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 49–50. [Monsanto Chem. Co., Res. Dep. St. Louis, Mo. and Nitro, W. Virginia] [Received May, 1960]

Preliminary tests of avadex (*cis* and *trans* isomeric mixture of 2,3-dichloroallyl diisopropylthiolcarbamate) are reported. In glasshouse tests, 1 oz/ac applied before emergence and incorporated with the soil consistently prevented wild-oat germination and emergence. Rates of 4 lb/ac and above applied as a foliage spray to seedlings up to 2 weeks old effectively controlled wild oats and some other grass weeds.—A.M.H.

901 Corns, W. G. **Comparative effects of avadex, carbyne and fenac on seedlings of wild oats, wheat and barley.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 15–16. [Dep. Pl. Sci., Univ. Alberta] [Received May, 1960]

Wild oats, Parkland barley and Thatcher wheat were germinated in petri-dishes. The concentrations of avadex, carbyne and fenac giving incipient and complete inhibition of growth in the dishes are tabulated. Barley was more sensitive than wheat to carbyne and more susceptible than wheat or wild oats to fenac. Data are also given on the survival, height and dry weight of plants grown in black loam soil in a glasshouse 1 month after soil treatment with the 3 herbicides. Carbyne used as a soil treatment caused very slight injury to wild oats. Injury to both wheat and wild oats was greater in sandy soil. Avadex gave favourable results for control of wild oats in wheat and barley, but fenac injured wheat and barley more than wild oats.—A.M.H.

902 Friesen, H. A. **The influence of dosage and volume of diluent on 4-chloro-2-butynyl N-(3-chlorophenyl) carbamate [carbyne] applied at two growth stages to control wild oats.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 35–6. [Exp. Fm, Lacombe, Alberta] [Received May, 1960]

In glasshouse and field experiments, carbyne at 0, 4, 8 and 16 oz/ac was applied to wild oats growing with cereals. The 2 heaviest dosages resulted in the greatest reduction in numbers of wild-oat plants and the greatest suppression of growth of the survivors. Carbyne at 4 oz/ac resulted in only a temporary suppression of wild oats, but when applied at the 1·5-leaf stage of wild oats growing in wheat it gave marked increases in wheat yield. Plant age and volume of diluent were critical factors in both glasshouse and field studies. Spraying at the 1·5-leaf stage of the wild oats and the 2·5-leaf stage of wheat gave better control of wild oats than later spraying. The use of 4–16 oz carbyne in 6 gal water/ac gave better results than when the volume was increased to 30 gal. Barley, wheat and flax were more tolerant to carbyne at the 2·5-leaf stage than at the 4-leaf stage. All oat varieties were very susceptible to this herbicide.—A.M.H.

903 Dubrovin, K. P. **Cyto-histologic responses of wheat and wild oats to carbyne.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 15. [Received May, 1960]

In glasshouse tests, Selkirk wheat and wild oats were sprayed with 0·25 – 2 lb carbyne/ac. The shoot apices of wild oats sprayed during the vegetative stage (21–22 days after emergence) became very swollen and distorted. Unemerged leaves and the bases of elongating leaves were also swollen. Shoot apices treated during the transition and floral stages were withered and shrivelled. The apices of wheat treated during its vegetative stage swelled slightly, but later the swelling subsided and normal growth and development occurred. The effect on wheat treated during its floral stage was identical to that on wild oats at a similar stage. The swelling appeared to be due to interference with normal cell division.—A.M.H.

904 Gull, P. W. and others. **Results of field trials with carbyne (4-chloro-2-butynyl N-(3-chlorophenyl) carbamate) on the control of wild oats in wheat, barley and flax.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 51.

Rate per ac and time of application were the only factors significantly affecting the activity of carbyne. The best rate for control of wild oats was 1 lb/ac ; 0·5 lb/ac was almost as good. Selkirk wheat was slightly stunted with 1 lb carbyne/ac but not with 0·5 lb/ac. Flax was severely stunted with 1 lb/ac and slightly with 0·5 lb/ac. The most effective time of application was 4–9 days after emergence of wild oats.—A.M.H.

905 Hagood, E. S. **1. An evaluation of 2,6-dichlorobenzonitrile as a control of wild oats and other species. 2. Evaluation of 2,6-dichlorobenzonitrile as a pre-planting soil-incorporated and a pre-emergence herbicide.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 36–7, 47–8. [Niagara Chem. Div., Food Mach. and Chem. Corp., Res. and Dev. Dep.] [Received May, 1960]

Dalapon, 2,6-dichlorobenzonitrile, propham and EPTC were compared as pre-sowing herbicides, incorporated in the soil. Twenty-one days after treatment, 4 lb 2,6-dichlorobenzonitrile/ac gave the best weed control, 98·1% control of wild oats and 98·4% of other annual grasses and of broad-leaved weeds. In further pre-sowing tests, 2, 3 and 4 lb 2,6-dichlorobenzonitrile controlled 91·5 – 100% of the wild-oat population. In pre-emergence tests, 2,6-dichlorobenzonitrile did not control wild oats as effectively as when it was applied before sowing and incorporated in the soil, but still gave better control than simazin or diuron. The effect of 2,6-dichlorobenzonitrile on 7 other weed species is summarized. In the same series of tests the effect of the herbicide on a variety of crops was investigated. Groundnuts, peas, soyabeans, wheat, oats, rice and maize sown 1 or 3 weeks after the pre-sowing treatments were not tolerant of the 1 or 4 lb/ac rates of 2,6-dichlorobenzonitrile. At 0·25 lb/ac the compound did not injure the crops or control the weeds. Results of pre-emergence tests indicated that 4 lb 2,6-dichlorobenzonitrile was a safe pre-emergence herbicide for use with crops of soyabeans, groundnuts, peas, potatoes, maize, barley, rice, wheat and sunflowers. In post-emergence tests, 4 and 6 lb 2,6-dichlorobenzonitrile /ac did not injure groundnuts, peas, rice or maize. —A.M.H.

906† Gustafsson, H. Skärpta bestämmelser mot flyghavren. [**More stringent regulations for the control of wild oats.**] *Hushålln. Sällsk. Tidskr.* 1960, **27**, No. 6, 125–6, illus. [Agric. Authority, Sweden]

Among contemplated changes in the existing regulations is the rescinding of that which permits fodder grain to contain 5 grains (seeds) of wild oats per kg.—G.M.R.

907 Nordisk Jordbrugsforskning. Resultater av nordiske fellesplaner for bekjempelse av kveke (*Agropyron repens* P.B.). [**Results of the associated Scandinavian plan for the control of *Agropyron repens*.**] *Nord. JordbrForskn.* 1960, Suppl. 1, 132–8.

Sweden. TCA at 25 kg/ha gave satisfactory control of *Agropyron repens*. Late autumn applications gave very good results in areas such as Norrland, where the frosts begin relatively early in autumn and little leaching occurs during winter, but in S. and central Sweden treatment in spring gave better results. Cultivating after treatment gave increased weed control. Cruciferous crops were resistant to TCA. Potatoes could not safely be grown directly after treatment in areas with low spring rainfall. Peas withstood up to 12·5 kg TCA/ha. Cereals could not usually be grown before 1 yr after treatment. Similar results were obtained where dalapon was used in place of TCA. Finland. Best control of *A. repens* was achieved with early spring applications of TCA. Denmark. TCA at 12·5, 25 and 50 kg/ha, and dalapon at 12·5 and 25 kg/ha, applied in early spring 4–6 weeks before sowing swedes or planting potatoes, gave good control of *A. repens*. In 4 trials with swedes, increasing rates of herbicide increasingly depressed yields. Yields of potatoes in 3 trials were severely reduced. In further trials with swedes where the rate of herbicide application was reduced to 10, 15 or 20 kg TCA and 5 or 10 kg dalapon/ha, yields were increased in most cases but severely depressed in others. Norway. In trials with swedes, turnips, fodder-sugar-beet, fodder-beet, rape, potatoes and white mustard [*Sinapis alba*], TCA was applied in early spring at 12·5, 25 and 50 kg/ha, and dalapon at 25 kg/ha. At harvest, the percentage of ground covered by *A. repens* in treated plots was 9, 5, 3 and 3%, respectively, compared with 34% in untreated plots. Where TCA was applied at 25 kg/ha, all the above crops except mustard yielded satisfactorily ; among the potato varieties grown, Kerr's Pink yielded 6% more when treated, and Marius II 13% less. Jøssing potatoes were fairly resistant to TCA.—R.B.

908 Corns, W. G. **Chemical control of couch grass.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 34. [Dep. Pl. Sci., Univ. Alberta] [Received May, 1960]

In 1957–9 amitrol, dalapon and TCA were compared as foliage and soil treatments against couch grass (*Agropyron repens*), in combination with roto-tillage before and/or after application of the chemicals. Amitrol was almost completely ineffective for killing rhizomes. Dalapon was more effective than amitrol but less so than TCA. Regrowth by 1959 on plots treated in 1957 was less than 5% after the use of 60 lb TCA/ac followed by a single cultivation the next spring. Foliar applications of TCA followed by one cultivation 2 weeks later were as effective as TCA applied to the soil after cultivation. In tests begun in 1959 there was extensive regrowth of couch grass after treatment with cacodylic acid. Fenac at 15 and 30 lb/ac prevented growth of annual weeds as well as virtually all regrowth of couch grass on areas tilled once, about 1 month after chemical treatment.—A.M.H.

909† Ingle, M. **Studies on the growth of *Sorghum halepense* under controlled conditions and on the physiological responses of plants to 2,2-dichloropropionic acid.** *Diss. Abstr.* 1960, **21**, No. 1, 15–16. [Purdue Univ., Lafayette, Indiana]

Sorghum halepense seedlings were grown in vermiculite culture under controlled environmental conditions. Under long-day conditions (16 hr), vegetative growth was proportional to temperature. Under short-day conditions (12 hr), vegetative growth was proportional to temperature up to 27°C, but at 32°C growth was severely restricted. At 21°C, the length of photoperiod had little effect; at 27° and 32°C, longer photoperiod resulted in proportionately greater growth. Elongation of basal axillary buds was favoured at 32°C. Subjecting plants to lower dark-period temperatures caused reductions in vegetative growth proportionate to the night temperature. Flowering was more abundant in photoperiods of 12 hours or less, but was not absolutely confined to the shorter photoperiods. In a study of the response of axillary buds on the rhizomes to environmental factors, one-node segments were cultured in flasks. Bud sprouting and initial growth, under constant conditions, were proportional to temperature, with the greatest increase occurring between 16°C and 21°C. Exposure to 8- or 16-hr photoperiods depressed sprouting, particularly at higher temperatures, but promoted initial bud growth. Temperature alternations had little effect on sprouting. Regardless of environmental treatment, all buds on these rhizomes developed into aerial shoots and never into rhizomes. Immersion of segments in herbicidal solutions for standard periods of time indicated that dalapon possessed more intrinsic toxicity to the buds than other herbicidal chemicals. Dalapon was also translocated to the rhizomes and retained its ability to inhibit sprouting for at least 4 weeks.—R.B.

910 Rea, H. E. **Controlling thick stands of Johnsongrass in row crops.** *Proc. S. Weed Conf.* [*USA*] 1960, **13**, 50–2. [Texas Agric. Exp. Sta., College Station, USA]

The costs of eradicating Johnson grass [*Sorghum halepense*] from crops of cotton and forage sorghum by spraying with dalapon and various toxic oil sprays are summarized.—A.M.H.

911 Williams, C. N. **Growth and morphogenesis of *Striga* seedlings.** *Nature, Lond.* 1961, **189**, No. 4762, 378–81, bibl. 15, illus. [Univ. Coll., Ibadan, Nigeria]

Seeds of *S. asiatica* (= *S. lutea*) were germinated in a solution produced by growing a variety of *Sorghum vulgare* (susceptible to attack by *Striga*) in pots of sand and eluting the sand with water. The effect of light of different quality on the growth of the *Striga* radicle was studied, together with the effect of GA and kinetin on growth of the *Striga* seedlings. The main effects of light (the most effective band being the blue) were a reduction in extension of radicle growth, an increase in radicle diameter, production of root hairs, and an occasional proliferation of cells into a branch-like swelling of the radicle. GA and kinetin (known to produce certain effects which resemble those caused by light) induced shoot development and branching of the radicle and it was concluded that the parasite probably depends for its growth on a supply of growth factors of this type from the host plant. There was also indication that a factor with strong morphogenic influence on the development of *Striga* seedlings was present in the rhizosphere of the host plant (*Sorghum vulgare* var.). From the results obtained and those of Worsham [*Fld Crop Abstr.* 13 : 933] it is concluded that one of the components of the germination complex may be a kinetin-like compound, of which the concentration required for *Striga* germination would be less than that required for morphogenic effects.—M.H.

912 Sunderland, N. **The production of the *Striga* and *Orobanche* germination stimulants by maize roots. 2. Conditions of synthesis in the root.** *J. exp. Bot.* 1960, **11**, No. 33, 356–66, bibl. 5. [John Innes Hort. Inst., Bayfordbury, Herts]

See also *Fld Crop Abstr.* 13 : 1965. The data obtained with isolated fragments of maize root indicate that synthesis of the *Orobanche* and *Striga* germination stimulants occurs in the root of the intact maize plant and that sugars are involved in their formation. Synthesis occurs in a comparatively short zone just as the cells are completing growth in length. With further development, the synthetic capacity of the root cells decreases. The stimulants are utilized during the growth in length of the root cells, and consumption also falls as the cells mature. Thus in intact roots stimulants accumulate in the more mature parts of the root from which they probably escape in greatest quantities into the soil. This is consistent with the findings of earlier workers that the stimulating substances are released from the root-hair zone. F. S.—M.H.

913† Johnson, Anne and Seng, T. K. ***Cleome ciliata* Schum et Thonn. in Singapore.** *Gdn's Bull.* 1959, **17**, No. 2, 325–30, bibl. 7, illus. [Dep. Bot., Univ. Malaya, Singapore]

Cleome ciliata, a native of tropical Africa, was first collected in Singapore in 1927 and has spread since then throughout the Island and in the Federation of Malaya. It is a weed of open waste land, roadsides and manure heaps. The percentage seed germination varies greatly but no germination occurs unless the seed is exposed to direct sunlight for at least 2 hr per day. The morphological development of the plant from germination to fruiting is described.—E.B.O.

914† Derscheid, L. A. **Methods of controlling Canada thistle.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 23–4. [S. Dakota State Coll., Brookings] [Received May, 1960]

Methods described for control of Canada thistle (*Cirsium arvense*) are : intensive cultivation from spring until freeze-up ; spraying with 2,4-D, MCPA or amitrol ; cultivation of cereals or forage crops combined with herbicide treatment ; use of various soil sterilants.—A.M.H.

915 Selleck, G. W. **Chemical and cultural control of absinth.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 34–5. [Dep. Plant Ecol., Univ. Saskatchewan, Saskatoon] [Received May, 1960]

The establishment of absinth (*Artemisia absinthium*) in cultivated fields may be prevented by summer fallow and autumn tillage. Amitrol, 2,3,6-TBA and mixed esters of 2,4-D gave 100% control of absinth with 1 application at 14 lb/ac or 2 at 4 lb/ac in one season. Borax at 1000 lb/ac also maintained 100% control of absinth.—A.M.H.

916 Alex, J. F. **Some aspects of the ecological life history of *Linaria dalmatica*.** *Diss. Abstr.* 1960, **20**, No. 7, 2508–9. [State Coll. Washington, Pullman]

This plant has become a serious weed in Spokane County, Washington.—A.G.G.H.

917 Derscheid, L. A. and others. **Russian knapweed control with cultivation, cropping and chemicals.** *Weeds* 1960, **8**, No. 2, 268–78, bibl. 10. [S. Dakota Agric. Exp. Sta., Brookings]

See *Fld Crop Abstr.* 13 : 415. A stand of *Centaurea repens* 6–12 in. tall was treated with 2,3,6-TBA amine at 4–6 lb a.e./ac on 20 May, and the land ploughed 10 days later and sown to maize. Almost complete control was achieved when the maize was cultivated 3 times. Maize was not damaged, except in one experiment where no rain fell between treatment and ploughing.—R.B.

918 Forsberg, D. E. **Control of hard to kill annual weeds.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 10–12. [Received May, 1960]

Recent developments in the control of wild buckwheat (*Polygonum convolvulus*), tartary buckwheat (*Fagopyrum tataricum*) and green foxtail (*Setaria viridis*) are reviewed.—A.M.H.

919† North Central Weed Control Conference [USA]. **Research reports 1959.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] and *10th W. Canad. Weed Contr. Conf.* 1959, 64–114. [Received May, 1960]

Brief reports by various authors are given under the following heads : (1) control of herbaceous perennial weeds, e.g. *Sorghum halepense*, *Agropyron repens*, *Cirsium arvense*, *Sonchus arvensis*, *Euphorbia esula*, *Cardaria draba*, *Linaria vulgaris* ; (2) annual, winter annual and biennial weeds, e.g. *Avena fatua* and *Setaria* spp. ; (3) weed control in field crops, namely : maize, sorghum, soyabean, forage legumes, cereals, flax, sugar-beet and sunflower. In addition, there are summaries of new research findings on various aspects of weed control intended as a supplement to extensive research summaries prepared by the NCWCC in 1958. —A.M.H.

HERBICIDES

920 Gleason, L. S. **"Randox T", a new broad spectrum pre-emergence herbicide.** *Proc. N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 54–5. [Received May, 1960]

The properties of randox T, a combination of 3 parts CDAA and 7·5 parts trichlorobenzyl chloride, are briefly described. It is suitable for pre-emergence weed control in maize, but not in soyabeans.—A.M.H.

921† Godfrey, K. L. and Hamm, P. C. **"Randox T," a new chemical weed control mixture for corn.** *Proc. 16th N. Cent. Weed Contr. Conf.* [*USA*] *and 10th W. Canad. Weed Contr. Conf.* 1959, 55–6. [Received May, 1960]

The results of tests of CDAA and randox T (CDAA + trichlorobenzyl chloride) on 14 species of crops and weeds are tabulated.—A.M.H.

922 Plant Protection Limited. **Diquat, a new herbicide and desiccant.** *Papers read at Symposium, Fernhurst, May 1960*, pp. 34.

This publication contains papers on the discovery, chemistry, mode of action and uses of diquat (1,1′-ethylene 2,2′-dipyridylium dibromide) and related chemicals. It is suggested that diquat may be used for : potato-haulm destruction, desiccating cotton before harvesting, the control of red rice, and as a selective herbicide in oats. It has a rapid action and is quickly inactivated.—S.M.J.

923 Ghosh, A. K. **A study of the factors effecting the herbicidal toxicity of ethyl-di-N-propylthiolcarbamate.** *Diss. Abstr.* 1960, **20**, No. 12, 4481–2. [Univ. Illinois, Urbana]

EPTC at 2, 3 or 4 lb/ac, incorporated into the soil or given as a pre-emergence treatment, was applied to crops of maize and soyabeans in 1958 and '59. Weed control was equally effective in both years. Annual grasses were more effectively controlled than broad-leaved weeds. Incorporation of herbicide in the soil gave more effective weed control but damaged the crop more and gave lower yields than pre-emergence treatments. Weather had a greater influence on the effectiveness of pre-emergent treatments than of incorporation treatments. In glasshouse trials, incorporation and pre-emergence treatments with EPTC at 6 lb/ac gave 90 and 60% control of oats and millet [sp. not given], respectively, in dry or wet soil. EPTC at 4 lb/ac incorporated into dry soil did not injure oat seeds when the seeds were removed after 6 weeks and germinated in fresh soil. EPTC at 0·01 to 100 ppm. inhibited shoot growth but did not markedly inhibit root growth in maize, while higher concentrations were toxic to germinating maize. Vapour from 1000 ppm. EPTC solution inhibited shoot elongation in soaked seeds of oats and maize exposed to the vapour for 1 to 24 hr.—R.B.

924† Hoffmann, O. L. and others. **Factors affecting the activity of 4-chloro-2-butynyl N-(3-chlorophenyl) carbamate as a selective herbicide.** *Weeds* 1960, **8**, No. 2, 198–203, bibl. 7. [Spencer Chem. Co., Kansas City, Missouri]

925† Wallis, J. A. N. **Observations on the use of certain chemicals to mark herbicides to be used on grass.** *Pest. Abstr.* (*C*) 1960, **6**, No. 2–3, 52–4. [Dep. Agric. Coffee Res. Sta., Ruiru, Kenya]

The use of herbicides has been retarded because of the hazard of uneven distribution when applied by hand. A trial was carried out to find a dye which, added to a herbicide solution, would leave a deposit visible for 1–2 days. Methylene blue was the most suitable of the chemicals tested for marking herbicides to be applied to grass weeds. A concentration of 400 ppm. is adequate for immediate inspection, but for general use 1000 ppm. is probably necessary. Astraphloxin at over 1000 ppm. can be used if no persistence is required; its cost is 40% of that of methylene blue.—E.B.O.

926† Hull, H. M. **A tabular summary of research dealing with translocation of foliar-applied herbicides and selected growth regulators.** *Weeds* 1960, **8**, No. 2, 214–31, bibl. 87.

MISCELLANEOUS

927 Wiese, A. F. and others. **Chemical fallow in the Southern Great Plains.** *Weeds* 1960, **8**, No. 2, 284–90, bibl. 16, illus. [S. W. Great Plains Fld. Sta., Bushland, Texas]

Studies to find suitable herbicides for controlling annual weeds were carried out under dryland conditions during the fallow period of a wheat/sorghum/fallow rotation during 1955–7. 2,4-D ester at 1 lb/ac was the only herbicide to give satisfactory control of *Salsola pestifer*, *Kochia scoparia* and *Tribulus terrestris*. Dalapon, TCA, amitrol, monuron or fenuron applied to the foliage did not control *Eragrostis cilianensis* or *Panicum capillare*. Pre-emergence applications of herbicides were not successful. Dalapon at 6 lb/ac was more toxic to self-sown wheat and sorghum where the spray contained a wetting agent or an oil-water emulsion. Amitrol at the same rate injured self-sown winter wheat but not self-sown sorghum ; its toxicity was increased by adding a wetting agent. MH at the same rate injured self-sown sorghum but not winter wheat. Compared with land given subsurface tillage, fallow treated with chemicals stored less moisture ; the reduction was particularly marked at the time winter wheat was sown, and lower grain yields were obtained. Compared with sweep tillage, chemical treatment reduced the hazard of wind erosion.—R.B.

928† van der Lingen, I. and others. **Weed control in dams and irrigation channels.** *Rhod. agric. J.* 1960, **57**, No. 5, 353–8, bibl. 6.

Recommendations are made for the control of aquatic weeds in stock-watering dams, where a constant water level is maintained, and in irrigation and other dams where usage in the dry season results in a fall in water level. The fish *Tilapia melanopleura* and *T. mossambica* control submerged succulent weeds. Pekin and Rouen ducks control submerged vegetation and tough floating weeds at normal altitudes ; at higher altitudes swans may be used instead of ducks. Mechanical control methods include the use of a boomerake and cutting blades attached to flat-bottomed boats. The following chemicals are listed for the control of water weeds : sodium arsenite at 3–5 ppm. (non-toxic to fish) for killing *Potamogeton* and *Ceratophyllum demersum* ; copper sulphate at 1 lb Cu per 100,000 gal water (copper salts are toxic to fish at > 3 ppm.) ; xylene or naphtha combined with MN 320/lissapol N emulsifier ; auxin-type growth regulators e.g. 2,4-D and 2,4,5-T for submerged water weeds ; other growth regulators such as dalapon, CMU, simazin, polychlorbenzoic acids, amitrol ; the contact herbicide PCP for *Salvinia* ; RADA, delrad and phygon for algae. The more important weeds likely to be found in dams in Southern Rhodesia are discussed.—S.M.J.

929† Allsopp, W. H. L. **The manatee : ecology and use for weed control.** *Nature, Lond.* 1960, **188**, No. 4752, 762. [Fisheries Lab., Dep. Agric., P.O. Box 174, Georgetown, Br. Guiana]

Experiments made during 1959–60 have shown that 2 manatees (*Trichechus manatus*) 7·5 ft long were capable of clearing weeds from a canal 22 ft wide and 1600 yd long in 17 weeks. It is claimed that, as a means of water-weed control in some countries, these mammals (voracious grass-feeders) are preferable to chemical herbicides.—M.H.

SURVEYS AND LAND USE

SURVEYS

930† Frankart, R. Carte des sols et de la végétation du Congo belge et du Ruanda-Urundi. Notice explicative. 14. Uele. [**Map of soils and vegetation of the Belgian Congo and Ruanda-Urundi. Explanatory note. 14. Uele.**] *Publ. INÉAC* 1960, pp. 128, bibl. 15, maps.

Information is given on the climate and vegetation of areas surveyed in the Uele region with a view to developing the agriculture there. Maps of soils and land utilization are given. The classification of land is based on its ability to grow cotton.—E.B.O.

931 Aguirre, R. **Chilean agriculture.** *World Crops* 1961, **13**, No. 2, 47–50 and 55, illus. [Univ. Chile]

932† Prutovyh, P. N. [**Agricultural production and specialization according to regions in RSFSR**]. [Russian] *Vestn. S-H. Nauki* (*J. agric. Sci., USSR*) 1960, **5**, No. 9, 23–32.

The agriculture in 22 regions of the Russian Socialist Federated Soviet Republic is described. —M.H.

933 Klimov, Ja. I. [**Possibilities of increasing the production of hard wheats in the Čeljabinsk Province.**] [Russian] *Zemledelie* (*Agriculture, USSR*) 1960, **8**, No. 12, 30–4. [Čeljabinsk State Agric. Exp. Sta.]

From studies made during several years the author claims that in the forest/steppe and steppe zones of this Province sowings of hard wheats should occupy 30–35% of the total area under

wheat in order to meet requirements within the area and to foster exports. Compared with soft wheats, hard wheats are more profitable in this region. The average purchase price of soft wheat is 75 roubles per 100 kg grain and an average yield in the forest/steppe area is 1760 kg/ha. The average price of hard wheat is 100 roubles for 100 kg grain and an average yield in the forest/steppe area is 1680 kg/ha.—M.H.

LAND USE

934 HIRST, H. **Land use projects in Cyprus.** *Trop. Agric. Trin.* 1960, **37**, No. 3, 177–84, illus.

Two farming projects being developed by the Government of Cyprus on Crown lands are described. The 11-yr-old Paphos Chiftliks project is concerned with land in the S.W. of Cyprus which had been neglected and was compulsorily acquired from absentee landlords. Tenants are required to follow a winter legume/cereal/summer-crop rotation which includes broad beans [*Vicia faba*], chick peas [*Cicer arietinum*], *Lathyrus*, vetches [*Vicia* spp.], lentils [*Lens culinaris*], wheat, barley, cowpeas [*Vigna sinensis*], cotton, sesame [*Sesamum indicum*], haricot beans and hemp [*Cannabis sativa*]. The 9-yr-old Ploushia project covers 1330 acres of scrub forest at the E. end of the northern range of mountains. This area is being developed as a pilot project with a view to the adoption of the same development techniques in similar areas of land throughout the island. The work envisaged consists of improving existing cultivated areas, developing others to render them cultivable, and the promotion of controlled sheep-grazing under co-operative ownership.—S.M.J.

935 WORLD CROPS. **In arid Arizona useless desert has become valuable cotton land.** *World Crops* 1960, **12**, No. 10, 378–9, illus.

936† AHMAD, S. **An international study of the arid-zone land use problems. 2.** *Pakistan J. For.* 1959, **9**, No. 2, 96–117, bibl. 143, illus. [Multan, Pakistan] [Seen Jan., 1961]

937† DIGAR, S. and SEN, A. K. **Significance of slope and erosion in land capability classification in the Machkund catchment.** *J. Indian Soc. Soil Sci.* 1960, **8**, No. 3, 157–69, bibl. 4. illus. [Indian Agric. Res. Inst., New Delhi]

938 JENSEN, C. W. **The effects of urbanization on agricultural land use in lower Michigan.** *Diss. Abstr.* 1960, **20**, No. 12, 4472. [Michigan State Univ., East Lansing]

LAND RECLAMATION

939† CONDON, R. W. **Scald reclamation experiments at Trida, N.S.W.** *J. Soil Conserv. N.S.W.* 1960, **16**, No. 4, 288–302, bibl. 3, illus.

The results of experiments described in *Herb. Abstr.* 29:71 are discussed. Rye (*Secale cereale*) sown at 20 lb/ac was superior to other cereals as a primary cover crop at Condobolin and Booligal. *Atriplex inflata* and *A. pseudocampanulatum* were vigorous colonizers on ploughed scald surfaces and provided a rapid early cover. The latter species required more moisture for germination than did the former and dominated areas where run-off water accumulated. *A. vesicarium* when sown at high rates with annual species produced a reasonable cover on scalded surfaces, but was not suitable for reclamation purposes when sown alone. Migrant species thrived in the favourable soil conditions created by the saltbush plants and eventually dominated the area completely. *Hordeum leporinum* and winter annual herbs predominated following good autumn and winter conditions but were replaced by *Chloris truncata* and *Danthonia* when good spring and summer conditions prevailed. The only perennial species which became established at Trida were *Bassia divaricata* and *B. brachyptera*. Complete ploughing with the introduction of *Atriplex* and rye are recommended only for areas lying east of the 15-in. rainfall isohyet where reasonably reliable winter rains can be expected. In other areas progressive cross-furrowing combined with the sowing of *Atriplex* was more successful.—S.M.J.

FARMING SYSTEMS AND PRACTICES

940 INSTITUT NATIONAL POUR L'ÉTUDE AGRONOMIQUE DU CONGO BELGE. [**Crop rotations.**] *Rep. INÉAC 1959* 1960, 597–601.

As a result of trials at various stations, different crop rotations are recommended for different regions and soil conditions. In the *Imperata* savanna (previously forest), where rainfall is the same as in the contiguous forest areas, the following rotation can be adopted on fertile soil. 1st year : 1st season (A), groundnuts, maize, food crops ; 2nd season (B), cotton. 2nd year : A, maize, food crops, groundnuts ; B, cotton intercropped with cassava, fallow. In the climax savanna with a long dry season, the best rotation under an exten-

sive system of farming is as follows. 1st year : A, land clearing ; B, cotton, possibly intercropped with gourds. 2nd year : A, groundnuts ; B, *Eleusine coracana* or sesame. 3rd year : A, cassava or sweet-potatoes ; B, cassava or sweet-potatoes. 4th year : cassava, fallow.—E.B.O.

941 Boswinkle, E. **The application of a phosphate fertilizer on different crop rotations in Kenya.** *E. Afr. agric. for. J.* 1960, **26,** No. 1, 65–7, bibl. 3. [Dep. Agric., Nairobi, Kenya]

In a trial begun in 1956 at Sotik in the Kenya Highlands, a total dressing of 210 lb double superphosphate/ac was applied over 3 yr to maize, wheat and potatoes, in 16 fertilizer/crop-sequence treatments. The highest gross profits were obtained when potatoes were planted in the 1st year followed by wheat or maize in the 2nd yr, provided the superphosphate application was made to the potatoes alone or to potatoes and maize. Maize/potatoes/wheat was the least satisfactory rotation. —S.M.J.

942† Essafi, A. Remarques sur l'importance et sur l'estimation de la fixation d'azote atmosphérique par les légumineuses sous le climat de la Tunisie. [**Observations on the importance and evaluation of the fixation of atmospheric nitrogen by legumes in the climate of Tunisia.**] *C.R. Acad. Agric. Fr.* 1960, **46,** No. 10, 611–13, bibl. 1. [Serv. Bot. Agron. Ariana, Tunisia]

Trials were carried out in containers of about 1/17 m^2 and 1 m deep to study a 4-year rotation, fallow/wheat/legume/wheat, with or without potash. The legume used was fenugreek (*Trigonella foenum-graecum*) which is grown for grain or fodder in Tunisia. The amount of N found in the above-ground parts was equivalent to 846 kg/ha and in the whole plants 1414 kg, for the containers without potash ; the corresponding figures for the containers with potash were 1020 kg and 1706 kg. —E.B.O.

943 Gillier, P. La reconstitution et le maintien de la fertilité des sols du Sénégal et le problème des jachères. [**The reconstitution and maintenance of soil fertility, and the fallow problem, in Senegal.**] *Oléagineux* 1960, **15,** No. 8–9, 637–43 and No. 10, 699–704, bibl. 3, illus. [Inst. Rech. Huiles et Oléagineux]

From trials over several years to study the maintenance of fertility in soils mainly sown with groundnuts, it is concluded that, with the application of mineral fertilizers and the use of crop rotations, including natural fallows protected from bush fires, it is possible to maintain the fertility of soils recently brought under cultivation and to make use of land which would otherwise become derelict. In traditional farming conditions green manuring is not recommended.—E.B.O.

944† Institut National pour l'Étude Agronomique du Congo Belge. [**Green manures.**] *Rep. INÉAC 1959* 1960, 406 and 525.

Pennisetum purpureum, sown in the dry season and ploughed in after 8 months in the wet season, yielded 44,000 kg green matter/ha ; when it was sown in the rainy season and ploughed in after 9 months at the end of the dry season, the yield was 23,000 kg green matter/ha. The sowing in wheat of lucerne and *Crotalaria usaramoensis* for green manuring was investigated. Sweet yellow lupin, black buckwheat and *Vicia villosa,* all green manure plants, were multiplied.—E.B.O.

945 Duley, F. L. **Yields in different cropping systems and fertilizer tests under stubble mulching and plowing in eastern Nebraska.** *Res. Bull. 190 Nebraska agric. Exp. Sta.* 1960, pp. 53.

The experiments reported were conducted for 20 years (1938–57) on silty clay loam derived from loess. Land with crop residues maintained at the surface accumulated more water during a summer fallow than ploughed land, and suffered much less run-off and erosion. But in general there was little difference in yield of crops after ploughing and sub-surface tillage, except that the latter was advantageous in dry years. All grain crops yielded more after sweet-clover [*Melilotus*]. Nitrogenous fertilizers increased grain yields when there was no legume in the rotation, but not when there was. Sweet-clover tended to deplete soil moisture in years of scanty rainfall. Stubble mulching also allowed soyabeans to be grown on sloping land with less fear of erosion.—J.D.J.

946 Rauhe, K. and Lehne, I. Ertragssteigerung bei landwirtschaftlichen Kulturpflanzen durch Bodenbedeckung mit organischen Stoffen. [**Yield increases in agricultural crop plants by mulching with organic matter.**] *Albr.-Thaer-Arch.* 1960, **4,** No. 5, 346–68, bibl. 25, English and Russian summaries. [Inst. Acker- u. PflBau Müncheberg, E. Germany]

Mulching, from Oct. to May, with straw, potato tops or stable manure had an equalizing effect on the daily and seasonal fluctuations in soil temperature at a depth of 5 cm. Of the mulches used, straw was the most and stable manure the least effective in moderating soil temperature ; potato haulms were intermediate in effect. In years with a low spring rainfall, the mulched areas retained 25% more of the winter-stored soil moisture than did the unmulched areas. The yield of root crops, grown as main crops, increased by 15–32%, the increase being much greater in sugar-

beet than in potatoes. The beneficial effect of mulching was carried over to the subsequent cereal crops. F. s.—D.B.

947 Rübensam, E. and Steinbrenner, K. Über den Einfluss der Beregnung auf den Ertrag einiger landwirtschaftlicher Kulturpflanzen bei hoher mineralischer Düngung. 1. Mitteilung. **[The effect of sprinkler irrigation on the yield of some agricultural crop plants under high rates of mineral fertilizer. 1st communication.]** *Albr.-Thaer-Arch.* 1960, **4**, No. 7, 507–26, bibl. 27, English and Russian summaries. [Inst. f. Acker- u. PflBau, Müncheberg, E. Germany]

Under high rates of mineral fertilizer, sprinkler irrigation resulted in considerably increased yields of winter- and spring-wheat, spring barley, winter rape and late potatoes, but not medium-early potatoes. The costs of the increased yields were low for late potatoes and much higher, though still economic, for rape and cereals.—D.B.

948 Singh, M. and others. **A critical review of the methods used to determine water requirements of crops and suggestions for planning future irrigation experiments in India.** *Indian J. Agron.* 1960, **4**, No. 4, 272–85, bibl. 35. [Indian Agric. Res. Inst., New Delhi]

The following methods for determining water requirements of crops are reviewed : pot- or tank-culture studies ; field studies based on soil-moisture determinations, or measurement of water coupled with soil-moisture determinations in irrigation experiments ; the climatological approach. The merits and limitations of each method are indicated. The problems and the important considerations in the planning of irrigation experiments are discussed. The need for evaluating water requirements based on the water regime concept is emphasised. Broad suggestions are made for the conduct of further irrigation experiments in India. F. s.—A.G.G.H.

949 Kung, P. **A note on some irrigation practices in Taiwan.** *Internat. Rice Comm. News Lett.* 1960, **9**, No. 3, 17–19.

Information is given on irrigation practices in Formosa where the irrigation water is distributed through a net of channels and is applied mainly to the 2 rice crops grown during March–Nov. In winter, irrigation water is applied to crops which require limited amounts of water ; these include sweet-potatoes, wheat, maize and flax. Information is also given on crop improvement through irrigation in the coastal saline region.—E.B.O.

950 Fukushima, T. and others. **Studies on time of main farm works in Japan. (1) Regional differences in time of farm works of rice culture and winter crops such as wheat, barley and etc., according to standard phenology of these crops, and their relations to regional average-year temperatures.** [Japanese] *J. Kanto-Tosan Agric. Exp. Sta.* 1960, No. 15, 1–17, bibl. 31, English summary.

This is a study of the regional limits of double-cropping in rice fields. In " common cultivation" rice is sown when the temperature rises to 9–10°C, and heading occurs when the temperature has fallen (after reaching a maximum) to 24·5 – 25°C. The possibility of cultivating rice is governed by the number of days between these two points in time. The earliest transplanting date is usually 40–45 days after the temperature has reached 9–10°C ; and 70–75 days are required from transplanting to heading. There is a greater range of transplanting time where the annual average temperature is 11°C than where this temperature is 10·5°C. Barley requires a temperature at ripening of 18·4 – 19·8°C for early varieties and 19·4 – 20·8°C for late varieties. The corresponding ripening temperatures for wheat are 20·3 – 21·5°C and 20·6 – 22·2°C. Rape requires similar temperatures for ripening. Potato (variety Danshaku) sprouts when the temperature reaches 13·9 – 15·4°C, and it is harvested when the temperature is 25°C, but in warm regions it can be harvested earlier when the temperature reaches 22 – 23°C. F. Eng. s.—D.B.

951 Fukushima, T. and Tatsuno, T. **Studies on time of main farm works in Japan. (2) Regional differences in time of farm works of cultivating rice, wheat and barley, in the cases of farmers' cultivations.** [Japanese] *J. Kanto-Tosan Agric. Exp. Sta.* 1960, No. 15, 18–31, English summary.

The times at which field practices for the above crops are carried out on farms and in the prefectural agricultural experiment stations corresponding to the farming regions are compared. F. Eng. s.—D.B.

952 Fukushima, T. and Tatsuno, T. **Studies on time of main farm works in Japan. (3) Iso-time line of main farm works in Japan.** [Japanese] *J. Kanto-Tosan Agric. Exp. Sta.* 1960, No. 15, 32–46, bibl. 4, illus., English summary.

These iso-time lines join up places in which certain field practices are carried out on the same date in Japan (a) at prefectural experiment stations and (b) on farms. The maps are reproduced in this paper. F. Eng. s.—D.B.

953† Lööf, B. Samodling av vårolje- och baljväxter. **[Growing spring oil crops and legumes together.]** *Lantm. Svenskt Land* 1960, **71**, No. 8, 163–5, illus. [Swed. Seed Assoc., Svalöf]

In the search for suitable support plants for peas and vetch, a trial was made at Svalöf in 1959 of white mustard, spring turnip-rape and *Camelina sativa*, respectively, each grown together with vetch (variety Svalöfs Luna). The oil-plant varieties were chosen for their stem stiffness and the probability that they would ripen at about the same time as the vetch for combine harvesting. The plots were sown on 19 March, the seed rates in kg/ha being : vetch, 160 throughout ; white mustard, 7 and 14 ; spring turnip-rape, 4 and 8 ; and *Camelina sativa*, 4 and 8. The vetch ripened about 2 August in all the plots, the turnip rape and *C. sativa* at approximately the same time, but the white mustard somewhat later. No differences in stem strength were perceptible, the weather being warm, dry, and favourable. A table giving the respective seed yields obtained shows that in every case the lower seed rate for the oil plants gave the better results, and calculation of the monetary value of the vetch + oil-crop seed (costs of manuring and production were the same in all cases) showed *Camelina sativa* to give the most profitable results, principally because of the considerably higher proportion of vetch seed from these plots. Reference is made to the results of similar trials made elsewhere. Further trials are necessary, but for the present it appears that white mustard, hitherto the most popular support plant, can well be replaced by *C. sativa* and spring turnip-rape.—G.M.R.

954 Wickizer, V. D. **Some aspects of agricultural development in the tropics.** *Trop. Agric. Trin.* 1960, **37**, No. 3, 163–75, bibl. 22.

Problems of labour supplies and mechanization in Africa are described and the development of tropical agriculture as a result of applied research is discussed.—S.M.J.

SOIL AND WATER CONSERVATION

955† Hanmer, T. H. **Land use and erosion in the Glen Innes area.** *J. Soil Conserv. N.S.W.* 1960, **16**, No. 4, 277–87, illus.

956† Haylett, D. G. **Run-off and soil erosion studies at Pretoria.** *S. Afr. J. agric. Sci.* 1960, **3**, No. 3, 379–94, bibl. 11, illus. [Fac. Agric., Univ. Pretoria]

For the crops studied, run-off was greatest under row crops, e.g. maize, less under close-growing hay crops, e.g. cowpeas, velvet beans (*Stizolobium* spp.) or teff (*Eragrostis tef*), and least under perennial established pasture, e.g. *Chloris gayana* swards or natural veld. Moderate utilization of the natural vegetation by grazing and winter burning did not materially reduce the efficacy of natural veld.—S.M.J.

957† Free, G. R. **Erosion characteristics of rainfall.** *Agric. Engng, St. Joseph, Mich.* 1960, **41**, No. 7, 447–9 and 455, bibl. 9, illus. [Cornell Univ., Ithaca, New York State]

AGRO-METEOROLOGY AND CLIMATOLOGY

958 Obolensky, G. Getreidekultur und Klima. 3. Vereinigte Staaten von Nord-Amerika, Sowjet-Russland, Finnland. [**Cereal cultivation and climate. 3. N. America, USSR, Finland.**] *Qual. Plant. et Materiae veg.* 1960, **7**, No. 4, 341–58, bibl. 38, maps 4.

The distribution of winter- and spring-wheat cultivation in Canada, USA, Finland and USSR is discussed in relation to climate. Phenological diagrams are given for various locations in each country. [See Abs. 563]—R.B.

959† Kaiser, H. Untersuchungen über die Auswirkungen von Windschutzstreifen auf das Bodenklima. [**Investigations into the effect of a shelter belt on soil climate (in North Rhine-Westphalia).**] *Z. Acker- u. PflBau* 1960, **111**, No. 1, 47–72, bibl. 32, English summary. [Agrarmeteorologische Versuchs- u. Beratungsstelle beim Wetteramt Essen, German Fed. Rep.]

The following statistically analysed results were obtained from observations made over several weeks on the leeward side of a windbreak, within a distance of 15 times the height of the screen. On average, the strength of the wind was reduced by 30% at a height above the ground of one-half to one-third the height of the screen. Soil moisture in the 0–40 cm layer increased by 3 – 11%. Soil temperature in the 10–50 cm layer increased by 0·3 – 0·5°C. The minimum night temperature increased by 0·1 – 0·3°C. There was an ameliorating effect to a distance of 30 times the height of the screen, and it resulted in improvements in yield and quality of sugar-beet. It is emphasized

that the quantitative results obtained apply to Nordrhein-Westfalen where the experiments were carried out and do not necessarily apply elsewhere. F. Ger. s.—D.B.

960† Woodruff, N. P. and others. **Influence of a field windbreak on summer wind movement and air temperature.** *Tech. Bull. 100 Kansas agric. Exp. Sta.* 1959, pp. 24, bibl. 14, illus.

Data are given on wind velocity and temperature in an open field and in various positions on the leeward (north) side of a quarter-mile-long, 10-row, 16-year-old windbreak of trees in a field near Lyons, Kansas. The results were used to calculate the effect of the windbreak on plant transpiration. They indicated that reductions of up to 31% of the open-field rate occurred in the zone between 2·2 and 12 tree-heights from the windbreak. F. s.—A.M.H.

961† Aslyng, H. C. and Hansen, L. Vandfordampning og vindhastighed ved statens forsøgsstationer. [**Water evaporation and wind speed at the Danish State Experiment Stations.**] *Tiddskr. Planteavl* 1960, **64**, No. 2, 185–212, bibl. 8. English summary. [Hydrotech. Lab., Roy. Vet. Agric. Coll.]

Investigations during 1956–9 of water evaporation and wind speed, in the field and in sheltered positions, at 17 locations in Denmark, are described. The results are tabulated.—S.M.J.

962† Bouchet, R. J. Évapotranspiration potentielle d'un couvert végétal : sa signification et sa mesure à partir de l'évaporation sous abris. [**Potential evapotranspiration of a plant cover : its significance, and measurement from evaporation under shelter.**] *C.R. Acad. Sci., Paris* 1960, **251**, No. 12, 1231–3. [Sta. Cent. Bioclimatologie, INRA, France]

963† Pelton, W. L. and others. **An evaluation of the Thornthwaite and mean temperature methods for determining potential evapotranspiration.** *Agron. J.* 1960, **52**, No. 7, 387–95, bibl. 21. [Wisconsin Agric. Exp. Sta., Madison]

Potential evapotranspiration estimates made by the Thornthwaite method were compared with evapotranspiration measurements chosen to meet the Thornthwaite definition of potential evapotranspiration. The Thornthwaite method was found unreliable for daily, 3-day, and 6-day-period estimates. The Thornthwaite method fails for short-period estimates principally because mean temperature is not a suitable physical measure of the energy either available for or used in evapotranspiration. The high mutual correlation of both evapotranspiration and mean temperature to net radiation that can be used advantageously for monthly, growing season, and annual estimates does not exist over short periods. Monthly mean temperature and potential evapotranspiration are highly correlated because both these factors depend upon radiation, which has annual periodicity. Energy balance data were considered a more reliable basis for estimating short-term potential evapotranspiration. F. s.—R.B.

964† Rose, C. W. and Farbrother, H. G. **A method of obtaining average bearing and incidence of rainfall.** *Quart. J.R. met. Soc.* 1960, **86**, No. 369, 408–11, bibl. 6. [Makerere Univ. Coll., Uganda (C.W.R.) and Emp. Cott. Gr. Corp., Namulonge, Uganda (H.G.F.)]

965† Peake, J. S. **The prospects of rain-making in the Federation.** *Proc. Trans. Rhod. sci. Assoc.* 1960, **17**, 13–22. [Fed. Met. Dept., Salisbury, Fed. of Rhodesia and Nyasaland]

966† Eriksson, E. Säsongvariationerna i luftens svavelhalt. [**Seasonal variation of sulphur content in the air.**] *Växt-närings-Nytt* 1960, **16**, No. 4, 1–3, bibl. 3, English summary. [Internat. Meteorol. Inst., Univ. Stockholm, Sweden]

Recent research in Scandinavia has shown that S compounds in the air are important for plants. The S content of the air depends upon meteorological factors influencing the vertical mixing (turbulence) of the air. As this turbulence is slight during winter but great during summer, S is carried away more rapidly in summer than in winter. F. Eng. s.—E.B.O.

967† Institut National pour l'Étude Agronomique du Congo. Bulletin climatologique annuel du Congo et du Ruanda-Urundi, année 1959. [**Annual climatological bulletin of the Congo and Ruanda-Urundi, 1959.**] *Comm. 19 Bur. climatol. INÉAC* 1960, pp. 181. [Bruxelles]

MISCELLANEOUS

968† Pereira, H. C. and Vernon, A. J. **Practical aspects of field experimentation in Africa.** *E. Afr. agric. for. J.* 1960, **26,** No. 1, 35–41. [E.A.A.F.R.O., Muguga, Kenya, and Rothamsted Exp. Sta., Harpenden, Herts]

969† Specht, G. Einfluss der Anlagemethoden und Standortverhältnisse auf die Effektivität von Feldversuchen. [**The influence of experimental design and site conditions on the efficiency of field trials.**] *Z. landw. Vers-UntersuchWes.* 1959, **5,** No. 6, 483–514, bibl. 15, Russian and English summaries. [Inst. landw. Versuchs- und Untersuchungswesen, Potsdam, E. Germany] [Received Nov. 1960]

970† Schrenk, A. Verhütung von Vogelschäden auf Versuchsflächen. [**Protection of experimental plots from birds.**] *Saatgut-Wirtsch.* 1960, **12,** No. 9, 243–4, illus. [Inst. Acker- u. PflBau, Berlin-Dahlem]

A cobweb-like veil consisting of thousands of white threads kept sparrows off a nearly ripe wheat field of 2700 sq. m. The sparrows were immediately bewildered by the veil and did not attempt to penetrate it. The veil was made by unravelling a 12-m-long " cable " [bundle] consisting of thousands of white threads (known in the market as Agrolam), and it was spread by 4–5 people holding the bundle and walking backwards through the field, freeing the threads which were held up by the wheat ears. The crop can continue its development beneath the veil which allows plenty of ventilation for the plants. Before harvesting, the veil is removed. The threads cannot be used again.—D.B.

971† Gruch, W. and Steiner, P. Zur Toxikologie der Insektizide. Literaturübersicht. 2. Teil : Toxaphen-Gruppe. [**Toxicology of insecticides. Literature review. Pt 2 : Toxaphene group.**] *Mitt. Biol. Bundesanst. Berl.* 1960, No. 102. [Inst. Pflanzenschutzmittelprüfung, Braunschweig, Ger. Fed. Rep.]

972† Dutt, N. and Kundu, B. C. **Hazards of improper application of insecticides in agriculture.** *Sci. and Cult.* 1960, **26,** No. 1, 11–16, bibl. 56. [Jute Agric. Res. Inst., Barrackpore, W. Bengal]

973 Lomakka, L. Norra Fennoskandias jordbruk. Del. 1. Naturgeografiska förhållanden i norra Fennoskandia. [**Agriculture in Northern Fennoscandia. Part 1. Geographical conditions.**] *Nord. JordbrForskn.* 1958, **40,** No. 3–4, 133–351, bibl. 210. [Received Feb. 1960]

Fennoscandia is a composite name indicating Norway, Sweden and Finland. The northern section treated in the present work lies between latitudes 62 and 71 and longitudes 8 and 31. Part 1 presents a study of the topography, soils and climate of the region.—G.M.R.

974† Paatela, J. Varför stiga inte hektarskördarna ? [**Why do not yields increase ?**] *Nord. JordbrForskn.* 1958, **40,** No. 2, 95–104. [Plant Prod. Inst., Univ. Helsingfors, Finland]

The average yields of wheat, rye, maize, oats, potatoes and hay grown in Finland during 1936–9 are compared with the same returns for 1951–5. The total figure for 1951–5 and the figures for all the crops except maize and oats are lower than those for 1936–9, in spite of a greatly increased use of fertilizer in the post-war years, the availability of improved crop-plant varieties, a considerable increase in the practice of subsoil drainage, greatly developed measures of plant protection and much more mechanization. The discrepancy is not easy to account for, but in the 1950's the weather was less favourable than in 1936–9, when growth periods were warmer and longer. Further, the main region of crop production in Finland has shifted more to the north because of the ceding of territory in the south to the USSR. While the normal growth period in southern Finland is 160–170 days, in Lapland it is only 110–130 days, so that yields are reduced, except in the case of potatoes and hay, as cultivation advances northwards. Another contributing factor to the relatively poorer yields of 1951–5 was the bad harvest weather of the years 1952–5.—G.M.R.

975 FAO. Plant introduction newsletter. 1960, No. 8, 1–44, bibl.

This includes sections on : German botanical and agricultural expedition to the Andes, 1959, by H. Ross ; Preliminary report of the botanical mission of the University of Kyoto to the Eastern Mediterranean countries, 1959, by K. Yamashita; FAO activities in seed exchange March/August 1960.—A.G.G.H.

REPORTS

976 **Great Britain.** Committee for Colonial Agriculture, Animal Health and Forestry Research. 14th Annual Report 1958–59. London, 1959, pp. 17–192.

Brief accounts are given of : regional research in East- and West-Africa and the West Indies ; research projects financed by British funds in 13 Commonwealth countries ; and research undertaken by Colonial Departments of Agriculture in 30 countries.—A.G.G.H.

977 **Great Britain.** Pest Infestation Research. Report of the Pest Infestation Research Board with the Report of the Director of Pest Infestation Research, 1959. Agricultural Research Council, 1960, pp. 62, illus.

See Abstracts 588, 729.

978 **Great Britain.** Norfolk Agricultural Station. Fifty-second annual report 1959–60. Sprowston, 1960, pp. 23, illus.

See Abstracts 607, 762.

979† **Belgium.** Nationaal Centrum voor Grasland- en Groenvoederonderzoek. 2e Sektie : Verbetering van de Graslandflora. Beknopt verslag aan het I.W.O.N.L. over de onderzoekingen uitgevoerd in 1958–1959. [National Centre for grassland and fodder-crop research. 2nd section : Improvement of grassland flora. Summarized report to the Institute for Scientific Research in Industry and Agriculture on the investigations carried out in 1958–9.] Gent : Rijkslandbouwhogeschool, 1960, pp. 42, mimeo.

See Abstract 757.

980 **Republic of the Sudan.** Empire Cotton Growing Corporation. Progress Reports from Experiment Stations. Season 1959–60. London, 1960, pp. 33.

See Abstract 803.

981 **Nigeria.** Annual Report of the Department of Agricultural Research 1958–59. Lagos, 1960, pp. 43.

See Abstracts 686, 789, 792, 795.

982† **Kenya.** Land Development Board (Non-scheduled Areas) [ALDEV]. African Land Development in Kenya. Report for the financial year 1958–9, 1st July, 1958–30th June, 1959. 1960, pp. iv + 91, illus., 1 map. [Received Nov. 1960]

983 **Kenya.** Empire Cotton Growing Corporation. Progress Reports from Experiment Stations. Season 1958–59. London. 1960, pp. 9. [Received Aug. 1960]

See Abstract 818.

984† **Congo.** Institut National pour l'Étude Agronomique du Congo Belge. Rapport annuel pour l'exercice 1959. [Annual report for 1959.] Bruxelles, 1960, pp. 604.

See Abstracts 564, 608, 614, 658, 687, 718, 725, 738, 771, 790, 793, 801, 840, 940, 944.

985 **Australia.** Annual report of the Department of Agriculture of Western Australia for the year ended 30th June, 1959. [n.d.], pp. 47.

See Abstract 705.

BOOKS

986 Centre d'Étude de l'Azote. **Progressive wheat production.** 1960, pp. 338, illus., 27 × 20 cm, Geneva : Centre d'Étude de l'Azote.

The Centre d'Étude de l'Azote is an organization founded in 1953 by nitrogen producers of Austria, Belgium, France, Germany, Italy, the Netherlands, Norway, Switzerland and the U.K. This publication on wheat is the fourth in a series dealing with soil fertility and manurial problems. Wheat was chosen as the subject because of its important and ancient place among food crops. Part 1 covers general problems on : economics, by F. C. Schlömer ; botany (morphology, reproduction, varieties) and breeding, by F. Wienhues ; cultivation, (in German) by L. M. Kopetz ; and nutrition and mineral fertilizers, (in French) by Y. Coix. Part 2 is concerned with special features of wheat cultivation in each of the main wheat-growing countries. The account for each country follows the same pattern (area and production, varieties, breeding, quality, cultural practices, fertilizers, pests and diseases) and ends with a list of research institutes in which wheat investigations are carried out in that country. The book is well illustrated.—D. Brown.

987 Danish Producers and Exporters Potato-Union. **Danish potatoes.** [n.d.], pp. 36, 21 plates, 31 × 24 cm, Copenhagen :

The Danish Producers and Exporters Potato-Union.

An account is given of the production of seed potatoes in Denmark and their treatment and control before being approved for export. There are full-page coloured illustrations and descriptions of 21 Danish potato varieties.—C.L.S.

988 SETHI, B. L. and others. **Cotton in India. A monograph. Vol. 2.** 1960, pp. viii + 339, bibl. at end of chapters, illus., 26 × 19 cm, Bombay : Indian Central Cotton Committee, 45s. or Rs. 30.

The second volume follows the first [see *Fld Crop Abstr.* 13 : 2047] with commendable promptitude after an interval of only 5 months. Its 5 chapters are devoted to : physiology, agronomy, diseases, insect and mite pests, seed multiplication and distribution.

The chapter on physiology, which occupies nearly one-third of the book, is mainly concerned with the investigation of specific plant disorders. It opens with information obtained in the course of these investigations on more fundamental issues, such as the effects of : (a) plant spacing and nitrogen supply on relative growth rate and net assimilation rate ; (b) climate, variety and sowing date on plant growth and maturity period ; and (c) hormones on morphology and C and N metabolism. The disorders discussed are bud- and boll-shedding, now accepted as a natural consequence of the demand for nutrients overtaking supply ; leaf shedding and " bad opening " of bolls (tirak disease), ascribed to salinity at 3 ft in the sub-soil ; and 3 instances of leaf reddening, ascribed to nitrogen deficiency on sandy soils in Punjab and Sind (delayed by sulphate of ammonia), to crop maturity in Malwa (hastened by sulphate of ammonia), and to combination of high winds by day and low temperatures by night in Bombay-Karnatak.

The chapter on agronomy deals with all aspects of the cultivation of cotton, both rain-fed and irrigated, from sowing to harvest, in the various cotton-growing areas. It is illustrated by 4 photographs of key operations and by a series of drawings of simple implements. It closes with an account of improved varieties and seed multiplication and is clearly a most useful account for anyone with an interest in the crop and sufficient education to read it. There is no bibliography to this chapter.

The chapters on diseases and pests are written with a strong bias towards the agronomist's point of view and contain some useful facts about crop sanitation and factors which predispose the plant to attack. The final chapter expands the information given in Chapter 2 on seed multiplication and then digresses into the statistics of successive 5-year plans.

The scales on many of the graphs are difficult to read, the index is somewhat perfunctory, and once again the binding is deplorable.—J. D. Jameson.

989 SETHI, B. L. and others. **Cotton in India. A monograph. Vol. 3.** 1960, pp. viii + 295, bibl. at end of chapters, illus., 25 × 19 cm, Bombay : Indian Central Cotton Committee, 45s. or Rs. 30.

This volume, the third in a series of four dealing with cotton in India, gives information on the technology, ginning, pressing and marketing of cotton, the consumption of lint and cotton seed, legislative measures and exports and imports. Vol. I was reviewed in *Fld Crop Abstr.* 13 : Abs. 2047. For review of Vol. II see previous abstract.—C.L.S.

990 SINGH, D. **Rape and mustard.** 1958, pp. viii + 105, bibl. 154, illus., 29 × 20·5 cm, Hyderabad : Indian Central Oilseeds Ctte, Rs. 8.

The first chapter of this book deals with the nomenclature of the staple, Indian, cultivated oleiferous Brassicae which are generally divided into 3 groups viz., rai, sarson and toria. Rai or Indian mustard is *Brassica juncea* but the position with the scientific names of the rapes, sarson and toria is confusing. The author, who is also a plant breeder, suggests that the following names should be used : *Brassica campestris* var. yellow sarson—yellow sarson, *B. campestris* var. brown sarson—brown sarson and *B. campestris* var. toria—toria. The vernacular names for mustards and rapes are also listed.

Subsequent chapters deal with the morphology, floral biology, cytology, genetics and improvement of rape and mustard whilst separate chapters give accounts of their cultivation, uses, diseases and pests. There are two very short chapters dealing with *Brassica nigra* and *Eruca sativa*, respectively. —C.L.S.

991 LOCKARD, R. G. **Mineral nutrition of the rice plant in Malaya, with special reference to penyakit merah.** *Bull. 108 Dep. Agric. Malaya* 1959, pp. vii + 148, bibl. 117, illus., Kuala Lumpur : Dep. Agric., $6 or 14s. [Received Nov. 1960]

An account is given of detailed and extensive investigations into penyakit merah (" red sickness "), a physiological disease of rice which has been responsible for large crop losses. It is anticipated that if the recommended applications of N, P and Ca are applied, nearly all symptoms of the disease would be eliminated, provided that the water supply is adequate. There is some evidence to show that the " brown spotted type of penyakit merah " is due to Mn deficiency. —A.G.G.H.

992 Jones, W. O. **Manioc in Africa.** 1959, pp. xiv + 315, bibl. at end of chaps, illus., maps, 23 × 15 cm, Stanford, California : Stanford Univ. Press, $6.75. [Received November, 1960]

The author, who is executive secretary to the Food Research Institute, Stanford University, started a world-wide study of cassava in 1947, but narrowed it down to Africa in 1952. He has divided tropical Africa into 3 regions, Guinea Coast, Congo, and East Africa, and in 1953 he visited the first 2 of these regions, but not the third.

Four of the first 5 chapters deal in a general way with the plant and its environment, and with methods of cultivation, preparation and processing. They contain much valuable information, but it needs sifting. Chapter 3 is in the best tradition of American geographers ; it sets the historical background from the arrival of the Portugese in the 15th century to the present day, traces the spread of a crop which requires man's " conscious decision " to move it, and opens a fascinating but little known window on the history of Africa.

The next 4 chapters are concerned with production and consumption in the 3 regions. Although necessarily humdrum they give useful accounts of the place of cassava in the economy and diet of the people.

A final chapter brings together the author's conclusions. His main thesis is that cassava produces more calories per unit area, for less effort, than any other starchy staple food, and ought to be encouraged. He suggests that opportunities for mechanization lie with processing after harvest rather than with the growing of the crop in the field. He also draws attention to the value of cassava as a stock feed. But whether for man or beast cassava supplies starch only, and the " problem " remains that it is becoming a lazy man's crop, which satisfies hunger, but is deficient in proteins, minerals and vitamins, so that it requires supplementing, which the lazy or poor man will not do.

A book of this kind brings a lot of useful information together and is most welcome because there are still too few of them. But it cannot help being uneven, and in places unreliable. In any future edition there should be a reference when mentioning human protein-deficiency disease on p. 42 or p. 280, to the work of Trowell, Davies and Dean on kwashiorkor*. There is also a lack of awareness of the prevalence of mosaic disease in the crop, at any rate in East Africa. The paradox that the crop does not thrive in the drier parts of central Tanganyika and Kenya (p. 250) might well be explained by mosaic in areas where the vector would be likely to have recourse to the crop in large numbers, and the suggestion on p. 283 that mosaic is " nowhere disastrous " was certainly not true of the Teso district of Uganda in the 1940's. Finally a book which makes no direct reference to the work of H. H. Storey at Amani in breeding for resistance to mosaic is like an account of the life of Napoleon which omits mention of Wellington and Waterloo.

The book is more concerned with economics and diet than with botany or agriculture and the illustrations are confined to sketches at the head of each chapter. It is well indexed and the bibliographies have been painstakingly compiled, despite the omissions noted.—J. D. Jameson.

993 Johnston, B. F. **The staple food economies of western tropical Africa.** 1958, pp. xi + 305, bibl. at end of chapters, maps, 23·5 × 16 cm, Stanford, California : Stanford Univ. Press, $6.00 or 48s.

994† Uphof, J. C. T. **Dictionary of economic plants.** 1959, pp. 404, 24 × 18 cm, Weinheim : H. R. Engelmann (J. Cramer) ; New York : Hafner Publishing Co. ; Codicote, Herts : Wheldon and Wesley, Ltd.

In this annotated list of over 6000 economic plant species, a valuable accession to libraries of botanical research institutes, colleges and schools has been provided. Arrangement is alphabetical. The scientific names are given in heavy type and are followed by descriptive matter. Cross-references to common names or to products are in ordinary type. In addition to the information on individual plants, the book lists, under the generic names, groups of plants such as edible fungi, sources of fibre, food plants, emergency food plants, food plants for livestock (a formidable list), medicinal plants, etc. Printing was done in Germany. The type is clear and well spaced and the book is bound so that it opens out flat easily, considerations which make for easy reference. As with all good dictionaries, this one also affords pleasurable browsing. The bibliography (pp. 391–400) is comprehensive. —G. M. Roseveare.

995† Cañizo, J. del and others. Geografía agrícola de España. [**Agricultural geography of Spain.**] 1960, pp. 319, illus., Madrid. [Review seen in *Agricultura, Madr.* 1960,29, No. 339]

996† Almeida, A. A. de. Monografía agrícola de Massinga sede (Moçambique). [**Monograph on the agriculture of Massinga (Mozambique).**] *Mem. Trab. 35 Cent. Invest. cient. algod.* 1959, pp. 104, bibl. at the end of chapters, illus., 25 × 19 cm, Lisboa : Cent. Invest. cient. algod.

Information is given on climate, vegetation and agriculture in the region of Massinga (about 3143 km²). The possibilities for agricultural development are examined.—E.B.O.

*Trowell, H. C. and others. 1954. Kwashiorkor. London: E. Arnold and Co.

997† Addison, H. **Land, water and food.** [2nd edn] 1961, pp. xii + 284, bibl. 67, illus., 22 × 14 cm, London : Chapman & Hall, Ltd.

For a review of the first edition of this book see *Fld Crop Abstr.* 9 : 1043. In this revised and enlarged edition, the story of land reclamation has been brought up to date and new material included on topical matters such as the Aswan High Dam and irrigation developments in the USSR and the Chinese Republic. F. s.—c.l.s.

998† Hockensmith, R. D. [Ed.] **Water and agriculture. A symposium of the American Association for the Advancement of Science, Washington 29-30 December, 1958.** *Publ. 62 Amer. Assoc. Advanc. Sci.* 1960, pp. viii + 198, bibl. at end of papers, 24 × 16 cm, Washington, D.C. : Amer. Assoc. Advanc. Sci.

The contributions to the symposium are arranged under four heads : water for the future, water sources, water planning, and use and water control.—c.l.s.

999† FAO. **Production yearbook 1959.** 1960, **13**, pp. xii + 484, text in English, French and Spanish.

The information given (mainly in tabular form), for the countries of the world, covers the following subjects, amongst others : land use, irrigation, crops, fertilizers, pesticides and prices.—e.b.o.

1000† Purchon, R. D. [Ed.] **Proceedings of the Centenary and Bi-centenary Congress of Biology, Singapore, December 2–9, 1958. Papers delivered in the University of Malaya in commemoration of the works of Darwin, Wallace and Linnaeus.** 1960, pp. 333, bibl. at end of papers, illus., 20 × 26 cm, Singapore : Malaya Univ. Press ; London : Oxford Univ. Press. Price in U.K. 31s. 6d ; in Malaya $13.50.

The editor of this work considers that there is an increasing need for a general synthesis of biological knowledge. These Congress papers emphasize the inter-relationships of the various branches of biology, and are arranged in 9 groups of subjects among which are : evolution, parasitology, entomology and botany. The work which is probably of most interest to readers of this abstract journal is that of D. Dwight Davis on " The naturalist in the tropics to-day ", and of T. Harrisson on " Basic problems of jungle living ".—m.h.

1001† Ross-Craig, S. **Drawings of British plants. Part 15. Compositae. (1).** Unpaginated, 28 plates, London : Bell & Sons, Ltd., 1960, 9s. 6d.

1002 Kutschera, Lore. Wurzelatlas mitteleuropäischer Ackerunkräuter und Kulturpflanzen. **[Root atlas of Central European crop plants and weeds of arable land.]** 1960, pp. 574, bibl. 470, illus., 27 × 19 cm, Frankfurt am Main : DLG Verlag. 90.00 DM.

This book was inspired by plant sociological studies in Austria, largely in the neighbourhood of Klagenfurt. It is a well documented literature review on the structure and growth of roots, as well as a presentation of reproductions of prepared root profiles. The first part concerns roots in a general sense and deals with : root morphology, the influence of environmental factors on root growth, modifications of the effects of these factors by plant and animal life, relationship between root growth and soil type (classified according to the German system), and with the connexion between root profiles of individual plants, a plant stand and a plant association. The second, and by far the larger, part of the book is devoted to accounts of the root systems of individual plant species, grouped by families. Roots of about 400 species are described and illustrated by line drawings. Most of the species are weeds, but there are also some crop plants, e.g. wheat, oats, barley, rye, maize, millets, lentils, sugar-beet, potatoes, hemp, sunflower, rape and *Sinapis arvensis*. Throughout the work there is a strong ecological approach, and the author has been constantly mindful of the effect of a crop stand or the position of a weed in a field on the root structure of that weed. These root studies not only provide descriptions of roots which complement the descriptions of above-ground parts of plants such as are already given in floras, they also throw light on the sources of species, their present-day distribution and choice of habitat. The book is therefore as valuable to the botanist as to the agronomist. Although the bibliography is extensive, there are one or two serious omissions, e.g. Troughton 1957 and Weinmann 1948. The production is pleasing, and, because they are well spaced, the items in the bibliography and the index enhance the pleasure of using the book.—D. Brown.

1003† Woodford, E. K. [Ed.] **Weed control handbook.** 2nd edn, 1960, pp. vii + 264, 22·5 × 14 cm, Oxford : Blackwell Sci. Publ. Ltd., 17s. 6d.

The aim of this book has been to cover all questions that can arise in the chemical control of weeds. Thus it deals with those weed-killers which are established in use, and also gives the available information about those which are not yet fully proven, their chemistry, their effects and recommended rates of application. It lists the weeds and their susceptibilities, the crops and their resistances. Methods for applying herbicides are described, and sections are devoted to such matters as spray drift and the legal aspects of herbicide use. F. s.—c.l.s.

1004† Ministry of Agriculture, Fisheries and Food, Great Britain. **Agricultural Chemicals Approval Scheme. List of ap-**

proved products 1961. 1961, pp. 93, London : Minist. Agric. Fish. Fd.

The Agricultural Chemicals Approval Scheme (Insecticides, Fungicides and Herbicides) is a voluntary scheme under which proprietary brands of crop protection chemicals can be officially approved. It came into operation on 1 June, 1960, when it replaced the Crop Protection Products Approval Scheme. The purpose of the Scheme is to enable users to select, and advisers to recommend, efficient and appropriate crop protection chemicals and to discourage the use of unsatisfactory products. The chemicals included in the Scheme are those used for the control of plant pests and diseases, for the destruction of weeds, for growth regulation and other crop protection purposes, but those used as rodenticides and for purposes other than crop protection, e.g., for the protection of stored products and for veterinary or domestic uses, are not included. This List will be published on the 1 February each year and copies may be obtained free of charge from Ministry of Agriculture, Fisheries and Food (Publications), Ruskin Avenue, Kew, Surrey. F. S.—C.L.S.

NEWS AND NOTES

International

1005 The International Rice Research Institute was established as a non-profit-making corporation under the laws of the Republic of the Philippines on 14 Apr. 1960 in Manila with the support of the Ford and the Rockefeller Foundations of the USA. The Institute will be located at Los Banos on land of the College of Agriculture, University of the Philippines. It is expected that the construction of the building will be completed by Apr. 1962. The objectives of the Institute are : (a) to conduct basic research on the rice plant, and on all phases of the production, management, distribution and utilization of rice ; (b) to publish and disseminate findings of research and recommendations of the Institute ; (c) to distribute improved plant materials ; (d) to instruct young scientists, primarily from S. and S.E. Asia ; (e) to establish, maintain and operate an information centre and library on rice ; and (f) to organize or hold periodic conferences, forums and seminars for the purpose of discussing current problems. *Internat. Rice Comm. News Lett.* June, 1960.—E.B.O.

1006† An FAO Technical Meeting on Plant Exploration and Introduction will take place in Rome from 10 to 20 July, 1961, and all member countries of FAO are being invited to participate. One item of the provisional agenda is concerned with the preservation of primitive forms of cultivated plants and wild species in the natural vegetation, and another with the establishment of centres for exploration and introduction in regions such as the Near East, East Africa and Latin America. *Publ. FAO*/61/A/231.—E.B.O.

1007† Arid Zone Research. The Advisory Committee on Arid Zone Research held a review session on 19–20 May, 1960, to evaluate past activities, to determine the need for future international action and to make recommendations on a future UNESCO programme in this respect. The Committee had before it the papers and documents presented at the General Symposium on Arid Zone Problems held in Paris on 11–18 May, as well as the reports summarizing the discussion and conclusions of the various sessions. Among the summary reports were : Climatology and hydrometeorology with special regard to the arid lands, by C. C. Wallen ; Report on microclimatology, by W. R. van Wijk and J. de Wilde ; Salt-affected soils and plants, by L. Bernstein ; Plant physiology and arid zone research, by M. Evenari ; Plant ecology, by G. Lemee and L. Emberger. *Arid Zone UNESCO* 1960, No. 9.—E.B.O.

1008† A Symposium on Changes of Climate with special reference to the arid zones, organized jointly by UNESCO and WMO (World Meteorological Organization) will be held in Rome at FAO headquarters during 2–7 Oct. 1961. The purpose of this symposium is to bring together meteorologists, climatologists, geomorphologists and palaeobotanists, who have contributed to the subject. The main subjects discussed will be : changes during the period of meteorological records ; changes during the late geological and early historical records ; theories of changes of climate ; significance of changes of climate for water resources, geomorphology, soil, plant and animal ecology, and agriculture. Further information may be obtained from W. Moller, Arid Zone Unit, Department of Natural Sciences, Unesco, Place de Fontenoy, Paris–7e. *Arid Zone UNESCO* Dec. 1960 and *Nature, Lond.* 4 Feb. 1961.—E.B.O.

1009† OECD. The convention of OECD (Organization for Economic Co-operation and Development), which will succeed OEEC during the second half of 1961, and which the USA and Canada will join as full members, was signed in Paris on 14 Dec. 1960. The other 18 member countries are European. This new organization intends to play a positive role in agriculture, fisheries and food. [See also *Fld Crop Abstr.* 13 : 1044.] *Fatis Rev.* 1960, Vol. 7, No. 6.—E.B.O.

Great Britain

1010† Commonwealth Agricultural Bureaux. On 31 December, 1960, Sir Herbert Howard retired from the post of Secretary of the C.A.B. organization, an appointment which he had held since 1946. He was succeeded by Mr. A. E. Trotman, C.M.G., late Minister for Natural Resources, Tanganyika. We regret to report that Mr. Trotman died suddenly at Farnham Common on 14 January, 1961.—A.G.G.H.

1011 Sugar-beet. At a joint meeting of the Agriculture and Pesticides Groups of the Society of Chemical Industry on 11 Oct. 1960, problems of the sugar-beet crop in Britain

were discussed. In the first paper presented, on " Mechanization of the sugar-beet crop in Britain " by O. S. Rose, it was stated that, in 1960, about 5% of the crop had been treated with the pre-emergent weedkiller PCP, and that mixtures of endothal and propham have shown promising results. The next paper, by S. N. Adams, on " The manuring of sugar-beet ", reviewed the effects of the major nutrients and stated that recent N trials had not altered the old recommendation, i.e. 1–1·2 cwt of N/ac. The third paper, by R. Hull, was entitled " The losses caused by sugar-beet yellows, and the measures taken to control the disease ". Spraying the root crop with systemic insecticides to control *Myzus persicae* delayed the incidence of the disease and greatly augmented the sugar yield, but when the disease was prevalent, spraying did not prevent fields becoming yellow late in the season. In field trials in 1955–9, response to spraying varied for districts and years, and, to ensure that crops are sprayed only when economic yield responses are likely, a warning scheme is being run in conjunction with the British Sugar Corporation. Warnings are based on daily aphid counts in sugar-beet crops and are sent out locally direct to growers. The fourth paper, by R. A. Dunning, dealt with " Insecticides and fungicides used to control sugar-beet pests and diseases ". All sugar-beet seed is dressed with a fungicide, and steeping it in ethyl mercury phosphate is now being introduced commercially following outstanding results of trials over a number of years. In 1960, 75% of the total seed was dressed with insecticide ; in 1961 all seed will be dressed with either γ-BHC, dieldrin or heptachlor. *Chem. and Industr.* 28 Jan. 1961.—E.B.O.

1012 Moisture determination in Grain. Investigations were carried out by the Pest Infestation Board to develop a standard method for the determination of moisture in grain. In methods where oven drying was used, there was a greater variation in results for high-protein hard wheats, parboiled rice and flint maize than for soft wheats, milled rice, dent maize, oats and barley. Water added to soft wheat was accurately assessed by the oven method investigated (113°C for 4 hr in a ventilated oven) but water added to hard wheat was over-assessed. See *Fld Crop Abstr.* 13 : 1933. *Pest. Infest. Res.* 1959.—S.M.J.

Switzerland

1013† Bundesrat Dr. F. T. Wahlen has been elected President of the Swiss Federal Republic for 1961. Dr. Wahlen was formerly Head of Agricultural Division of FAO. He was for many years Director of the Swiss Federal Experiment Station, Zürich-Oerlikon, and also the Foreign Correspondent for Switzerland for this Bureau. It was Dr. Wahlen who successfully organized Swiss agricultural production during the 1939–45 war and enabled his country to achieve almost complete self-sufficiency in food and feeding stuffs.—D.B.

1014† In a paper read in Zürich, in Nov. 1960, to the Association of Swiss Farmers, Bundesrat [now President] Dr. F. T. Wahlen discussed self help and state help in agriculture. From the vantage point of his world background, he considered measures for improving the economic status of Swiss peasant farmers, e.g., by the consolidation of holdings. In 1955 there were 26,000 holdings of more than 20 plots each. His second theme concerned the relationships between production and markets, prices and costs. The Swiss farmer strives to obtain high yields ; he should rather aim at the optimal relationship between outgoings and yields. There is overproduction of milk in Switzerland, to remedy which he suggested an increase in the area of hybrid grain-maize, fodder cereals (if markets can be arranged), rape, and sugar-beet (the opening of a second sugar factory will shortly absorb this crop). Such cropping adjustments are possible for the 43,000 farmers with holdings of more than 10 ha, especially if they combine to form " self-help clubs ", on the Danish model, and use the advisory services. —D.B.

Scandinavia

1015 Eleventh Congress of the Association of Scandinavian Agricultural Scientists. The Proceedings of this Congress, held at Oslo in June, 1959, are published as Supplements 1 and 2 to *Nordisk Jordbrugsforskning* for 1960. Papers presented to the Crop Production Section, including some on temporary leys, are found in Suppl. 1, pp. 113–61. Individual papers are abstracted elsewhere in this issue of *Fld Crop Abstr.*—G.M.R.

Italy

1016† Seed Exchange. A list of seeds offered in exchange by the Istituto ed Orto Botanico, Università di Torino, includes many species of Gramineae, Cruciferae and Leguminosae, collected in 1960.—E.B.O.

Africa

1017 Edible African Legumes. *Cajanus cajan, Cassia tora, Kerstingiella geocarpa, Psophocarpus palustris, P. longepedunculatus, P. tetragonolobus, Vigna vexillata, Lablab niger, Lupinus termis, Lathyrus ochrus* and *Cyamopsis tetragonoloba* are illustrated, with notes on popular names and botanical characteristics, in *Riz et Rizicult.* for Sept. 1960. [See also *Fld Crop Abstr.* 14 : 545.]—E.B.O.

1018 A Symposium on Grain-eating Weaver Birds (*Quelea*), organized jointly by CCTA (Commission for Technical Co-operation in Africa South of the Sahara) and FAO, was held in Bamako, Sudanese Republic, from 17 to 21 May 1960. The main items discussed included the co-ordination of research and control on an interregional and interterritorial level, the review of the progress achieved in *Quelea* control, and the control of birds (named) other than *Quelea* which also constitute a menace to crops. Among the control methods, spraying the roosts with parathion is widely used and has given generally satisfactory results. (See also Rev. Art. *Fld Crop Abstr.* 10, No. 3.) *Pl. Prot. Bull.* Oct. 1960.—E.B.O.

1019† The First FAO Regional Conference for Africa was held in Lagos, Federation of Nigeria, from 3 to 12 Nov. 1960. Its main objects were to provide an opportunity for an exchange of views and information on food and agricultural policies and programmes, and to lay the basis for a review of the food and agricultural situation in Africa. The conference was attended by delegates from 14 African countries and from Belgium, France, Portugal and the UK. The proceedings were concerned with : the food and agricultural situation and the work of FAO in Africa ; and with

general policy on food and agricultural development in Africa. Among the aspects considered were the diversification of agriculture, and the conservation and utilization of soil, water and vegetation in regional and farm planning. *Publ. L-8573 FAO* [n.d.].—E.B.O.

India

1020† Dr. R. O. Whyte of FAO, Rome, is being transferred to India to assist the Government there to plan and establish an Indian Grassland Research Institute and to promote fodder production in 35 dairy development projects.—C.L.S.

1021 Sorghum and Millets. The Rockefeller Foundation is undertaking, in co-operation with the Government of India, a project involving the collection, testing, improvement and distribution of millets, particularly sorghums and pearl millet (*Pennisetum typhoideum*). The world germ-plasm bank for millets is to be established at the Indian Agricultural Research Institute, New Delhi, on the same basis as those banks established by the Foundation for maize germplasm in Mexico and Colombia. Most of the important sorghum germ-plasm has been obtained from the USA, S. America and India but more germ-plasm material is required from many other countries. In India, where probably about 25% of the population subsists largely on these crops as a staple diet, various types of sorghums and millets are grown on about 87 million acre. Sorghum (jowar) is grown on 42 million acre, second only to rice. Yields are, however, very low, the average yields of sorghum and pearl millet being 400 and 250 lb/ac, respectively. The millets are generally grown on very poor soils where rainfall is limited. The crops are given little care and rarely receive fertilizers. *Pl. Introd. Newsletter* Apr. 1960.—E.B.O.

USA

1022 Research on Groundnuts and Sesame. Research on groundnuts is carried out at the Agricultural Experiment Stations at : Gainesville, Florida ; Raleigh, N. Carolina ; Blacksburg, Virginia ; Experiment, Georgia ; and Tifton, Georgia. Research on sesame is carried out at the Agricultural Experiment Stations at Clemson, S. Carolina, and at College Station, Texas. The Leaders of Investigations for the Agricultural Research Service, USDA, are Mr. W. K. Bailey who is responsible for groundnuts and Dr. J. O. Culbertson for sesame. Both leaders are at the Plant Industry Station, Beltsville, Maryland.—From Bureau Correspondent.—D.B.

1023 Sun Heat for Drying Grain. In Kansas, maize was dried more quickly and effectively with a solar-heated air system than with a conventional non-heated air system. Fans in the solar-heating system used 50% less electric power than those in the conventional system. *Grain Storage News Lett.* Oct., 1960.—E.B.O.

Trinidad

1024 Yams. Since 1954 research has been in progress at the Imperial College of Tropical Agriculture on breaking dormancy, out of season production, and storage of Lisbon yams. It is expected that the results of these investigations will be published shortly.—A.G.G.H.

South America

1025 Research on Groundnuts and Sesame (Simsim). The main research centres for work on groundnuts are (1) Estación Experimental Agrícola de la Asociación de Agricultores de Caneti, at Caneti, Peru, and (2) Estación Experimental de Manfredi, at Manfredi, Argentina. For sesame the main research centres are (1) Centro de Investigaciones Agrícolas, and (2) Instituto Experimental de Agricultura y Zootecnia, both at Maracay, Venezuela. The two crops are also under investigation at Instituto Agronômico, Campinas, Estado de São Paulo, Brazil.—From Bureau Correspondent. —D.B.

Argentina

1026 Potatoes. A Meeting on Potatoes took place at the Estación Experimental Agropecuaria de Balcarce, province of Buenos Aires, during 26–30 Jan. 1959, and was attended by specialists from Argentina, Brazil and Peru. *Idia* 1960, Suppl. 2 gives the papers presented, which were concerned mainly with the following aspects of potatoes : improvement, varieties, disease- and weed-control, planting date, manuring and production of seed potatoes.—E.B.O.

1027 The First Argentinian Congress on Soil Science took place in Buenos Aires during 7–12 Sept., 1959, and was attended by specialists from Argentina and neighbouring countries. *Idia* 1960 Suppl. 1 gives an account of papers presented, some of which were concerned with the following subjects : seed inoculation and nodule formation in legumes ; burning of cotton stubble and its effect on soil fertility ; decreasing yields of maize in Argentina in relation to edaphic-climatic factors ; land surveys with a view to irrigation ; dune stabilization ; efficacy of different types of cultivation for the control of the natural vegetation ; manuring and irrigation of potatoes.—E.B.O.

Enquiries received

1028 Arising from enquiries answered by the Bureau from Jan. 1960 to Feb. 1961, bibliographies or memoranda on the following subjects were prepared and are available on request from the Director. S. 709. Wheat, protein and amino-acid content (43 refs) ; S. 688. Oats, development and morphology in relation to attacks by frit fly (13 refs) ; S. 698. Rice, interaction of yield and yield components with sowing date (18 refs) ; S. 695. Rice, list of research stations throughout the world ; S. 667. *Beta vulgaris*, classification of mangels and fodder-beet ; S. 735. Fodder roots (swedes, turnips and mangels) in Britain (90 refs) ; S. 719. Potato, dormancy-breaking (53 refs) ; S. 666. Cotton, climatic and physiological studies (96 refs) ; S. 728. Sunnhemp for fibre (6 refs) ; S. 729. Groundnuts, research centres for investigating their agronomy and breeding ; S. 730. Sesame (*Sesamum indicum*), research centres for investigating its agronomy and breeding ; S. 702. Growth analysis of crop plants (19 refs) ; S. 681. Irrigation water, effect of impurities on various crops (81 refs) ; S. 717. Dust, its effect upon land, crops and livestock (31 refs) ; S. 677. *Taraxacum officinale* and *Iva axillaris*, control by cultural methods (20 refs) ; S. 718. *Equisetum arvense*, *E. palustre* and *E. pratense*, control (23 refs) ; S. 732. Chlorpropham, its use for root crops (20 refs).—D.B.